Lion Series

WN-6720-XP
WN-6720-SXP
WN-6720-UXP

User Guide

clarity
visual systems

WN-6720-XP
WN-6720-SXP
WN-6720-UXP

67" Display Wall Unit

User's Guide

070-0094-07
19 November 2003

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1 Unpacking the Lion

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1.1 Unpacking the Display

You have already opened the package, but read this section anyway. It tells you how to take the two pieces apart and how to handle them.

The Lion ships in three main pieces:
- the lower (smaller) section,
- the upper (larger) section,
- the screen.

The Lion is packed with the lower section above the upper section to save space, and the two are bolted together.

The screen is packed in a separate compartment, because it is partly glass and requires special handling.

How to unpack the display

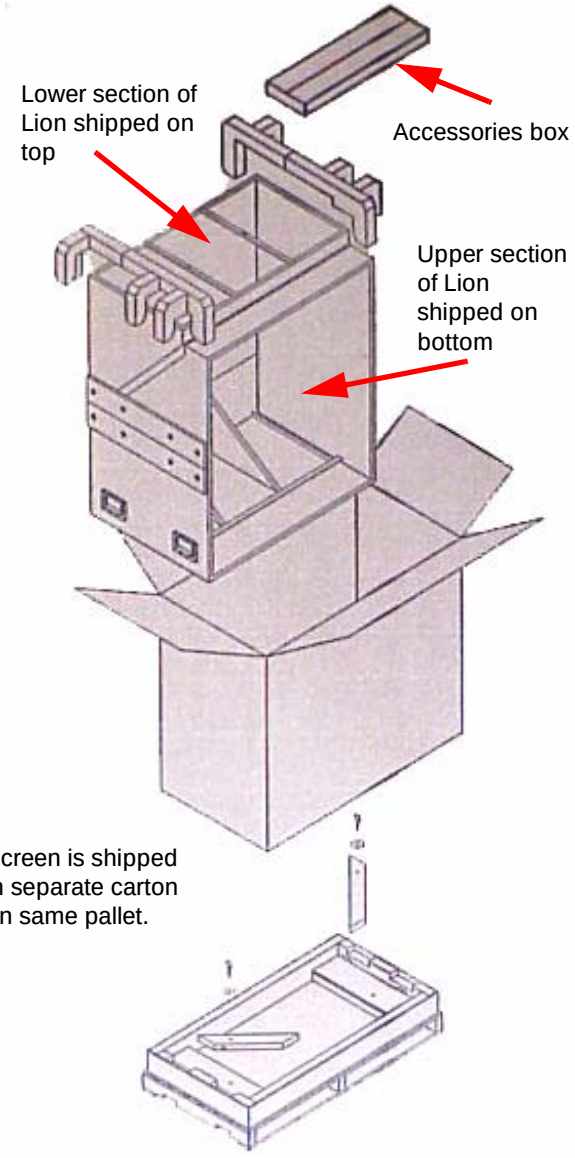
✎ Lions are usually shipped it groups to build a wall. Package number 1 will have the accessories necessary for building the wall. Open #1 first.

1. After cutting the packaging straps, lift the screen box off and set it aside. Keep it *vertical*, and set it down *gently*.

✎ In some shipments some or all of the screens are on a separate pallet. Leave them on the pallet until they are needed.

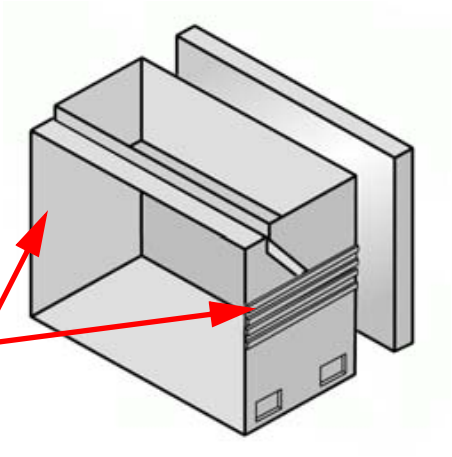
2. Open the top of the carton and fold the flaps down.
3. Using the flaps, lift the carton up and off the display.
4. Remove the packing material from the top and the accessories box.
5. Remove two bolts with wingnuts on them at each side of the display. This separates the two sections of the display. See pictures, opposite.
6. Lift off and set aside the top section. Use two persons to handle these sections. (This smaller part is the lower section of the display.)
7. Remove the two eye bolts holding the rest of the display to the pallet.
8. Lift off and remove the larger section. (This is the upper section of the display.)

✎ Do **not** remove the screen from its carton. Do **not** attach the upper, larger section of the display on the lower, smaller section at this time. You will do this eventually, but not now. The upper and lower sections of the display were calibrated as a unit during manufacturing. They have the **same serial number**. Keep them together as a pair when assembling later. The screens are not serialized.


Lower section of Lion shipped on top
Accessories box
Upper section of Lion shipped on bottom
Screen is shipped in separate carton on same pallet.

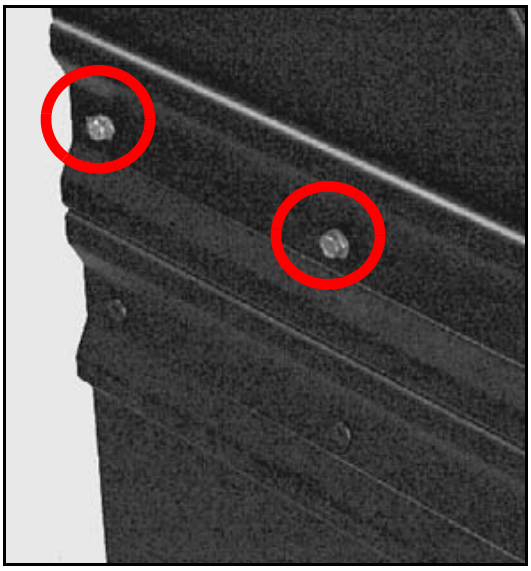
Upper and lower sections in larger carton

Screen in smaller carton



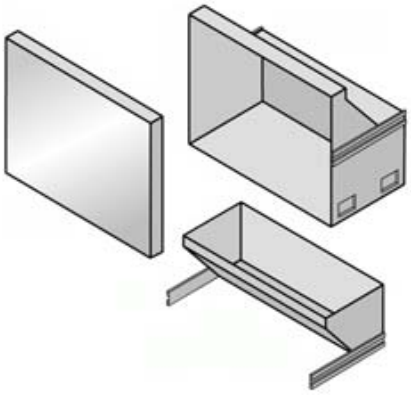
Retaining bolts are here

Lion as it is packaged



Retaining bolts on a Lion SX

Lion is it will be assembled



Step 5. Remove these wingnuts and bolts (two on each side) to separate the two parts of the Lion.

Retaining bolts on a Lion XP or UXP

1.2 What Accessories Should I Have?

Some of the accessories come with each WN-6720 display unit. Other accessories come with each order for displays.

The accessories for *each* display include things like the power cord, VGA cable, bolts. Each display needs a complete set of these items, and they are packed with the display.

The requirements for other accessories depends on the wall configuration. You need only one Center Screen Bracket for a 2 × 2 wall, but for a 1 × 4 wall, you don't need any. These accessories are shipped with each *order* for a group of displays. (Additional accessories may be ordered from Clarity, if the configuration changes.)

Accessories with *each order* of WN-6720 displays
(The list number corresponds to numbers in the pictures and diagrams.)

1. Center Screen Bracket: This large plate with 8 holes holds four displays together where they meet.
2. Side Screen Bracket: This plate, which has 4 holes and a *flange*, holds two displays together at the end of a row.
3. Top-Bottom Screen Bracket: This plate, which has 4 holes and *no* flange, holds two displays together at the top *or bottom* of a column.
4. UL-LR Screen Bracket: This plate, which has 2 holes and a flange, is used in either the upper-left or lower-right corner of a wall to hold the screen.
5. UR-LL Screen Bracket: This plate, also with two holes, is used in either the upper-right or lower-left corner.

> ✎ The screen brackets are marked '4-5' for WN-6720-SX and '3-4' for the WN-6720-X and -UX. They are not interchangeable between these model number groups

6. **Suction Cup**: This tool is used to open the screen after the wall is built, particularly screens in the middle of the wall where you cannot grab the edges.

Accessories with *each* WN-6720 display
(Numbers in parentheses after the item name is the quantity included with each display.)

1. **User's Guide**: (1, not pictured). This book is the User's Guide.
2. **Remote Control** (1): The batteries are already installed.
3. **Screen Latch** (2): Holds the screen open so you can work on the unit from the front.
4. **Power Cord** (1, not pictured): For use in North America.
5. **VGA Cable** (1, not pictured): 15-pin cable for analog computer pictures. Although this is called a VGA cable, it carries anything up to UXGA.
6. **Bolts**, side to side (2 bolts, 4 washers, 2 wingnuts): These are used to bolt the displays together side-to-side.
7. **Bolts**, 10-32 × a" flat head, Phillips (8) for screen alignment brackets.
8. **Digital Cable** (1, not pictured).
9. **Exhaust Fan Shroud** is stored in the Air Intake Bay and mounts on the Lamp Bay Cover.

Other things you may need

RJ45 to 9-pin adapter, if you will use RS232 commands to control the displays. It adapts the computer's 9-pin serial port to the RJ45 connector used on all the displays.

Computer network cables, to interconnect the displays for RS232 control, one cable for each display.

Tools:
#2 Phillips screwdriver
#3 Phillips screwdriver
flat blade screwdriver, large
socket wrench, a"

Screen cleaner: #50 Glass Cleaner (See 'Cleaners to use' on page 176 for details and alternatives.)

Service Manual: A service manual is available for purchase or from www.ClarityVisual.com, reseller section (part number 070-0054).

RJ45 to 9-pin adapter, partly assembled, not supplied.

RJ45 cable, computer network type, not supplied.

Customer supplies these items, if needed.

1.3 Quick Start

These instructions apply to setting up and testing ONE Lion alone. It is not necessary to do this if you are building a wall of Lions. For a list of steps to install and configure a wall of Lions, see 'What You Will Do' on page 28.

This is the fastest way to display a computer picture on *one* Lion. **Do not** use these instructions to build a wall of Lions.

Constructing one Lion

1. Unpack one Lion as described earlier in 'Unpacking the Display' on page 2.
2. Place the lower section on a flat floor.
3. Lift the upper section over the lower section and align the rear panels. Notice that pins in the lower section fit holes in the upper section. Place the upper (larger) section on top of the lower section.
4. Tighten all 10 captive screws inside the Air Intake Bay and Lamp Bay. There are 5 screws in each bay, 2 along the outside wall and 3 along the inside wall.

WARNING
Be sure these screws are tight before proceeding.

5. Change the light shield in the Electronics Bay to its operating position, higher and more toward the rear. Or remove the light shield completely for this test.
6. Remove the lens cap without turning the lens.
7. Remove the exhaust fan shroud from the Air Intake Bay and install it on the Lamp Bay cover with the opening to the rear.
8. Install 4 corner screen brackets, one in each corner of the large opening. There are two types of corner screen brackets: UL-LR and UR-LL, meaning Upper Left–Lower Right and Upper Right–Lower Left. The flanges should be on the left and right sides of the upper section, not on the top and bottom.
9. Extend the two arms in the upper section that will hold screen.
10. Remove the screen from the packing case.
11. Arrange the screen so the narrow slot on the side is at the top.
12. Loosen the nut behind this narrow slot on both sides. Notice that this nut has a shoulder on its inside.
13. With two persons, lift the screen at the sides. Tilt the bottom of the screen away from the display at 30° or more and hang it on the screen guide hooks so the upper studs on the screen go in the notches on the guide arms. It is easier to do this one side at a time, one person holding still, and the other person hanging the screen on the hook.
14. Tighten the nuts. These nuts have shoulders to hold the screen and allow it to rotate. Manipulate the screen to make the shoulders on the nuts go into the round holes in the screen guide arms. Tighten the nuts.
15. Push the screen in evenly on both sides. Press the heel of your hand against the corner until the spring-loaded latches click into place. You may have to lift the screen a little to get guide pins on the chassis to fit into the holes in the back of the screen. Don't hit the glass hard. Glass can break.

Connecting power and picture

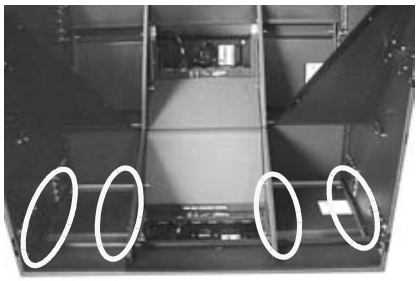
1. Connect the power cord and turn on the AC Master switch.
2. Connect a computer's VGA output to the Analog 1 input connector.
3. From the front of the display, aim the remote control at the screen from a distance of about 10 feet (3 m) and do the following:
   a) Press SOURCE on the remote. If the Source in this menu is not Analog 1, press the left arrow key several times until it is, then press ENTER.
   b) Press the down arrow to move the selector to Find Mode and press ENTER.
   c) Press FREQ/PHASE, highlight Find Freq/Phase and press ENTER.
   d) Press SIZE/POS and press ENTER twice.
   e) Press PREV.
   f) For optimum picture quality, go to 'Analog Level Adjustments' on page 84.

You should now see a picture on the screen.

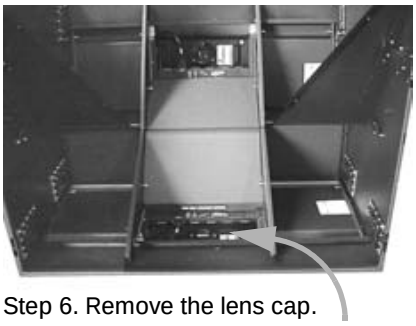
After testing

1. Turn off the lamps and replace lens cap.
2. Move the light shield into its original shipping position before removing the upper section
3. Take the display apart before moving it.
   a) Remove the screen and store it carefully.
   b) Remove screen brackets from corners and save them.

c) Return light shield to shipping position.
d) Remove upper section from lower section.



Step 4. Tighten 10 captive screws in these four areas.

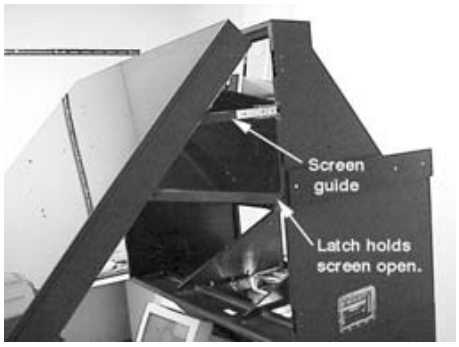


Step 6. Remove the lens cap.

Step 5.a Light shield in shipping position.

Step 5.b Light shield in operating position.

Upper Right Screen Bracket installed



Step 13. Screen should be at this angle when fitting screen guides. (Not necessary to install Latches for this test.)

Step 14. Screen guide arm, shoulder nut tightened. Screen should rest on shoulder of nut, not on threads of screw.

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2.1 Questions About the Lion

<table>
<tr><td>How high can I stack Lions?</td><td>Four units high without special support. Any wall two high or more should have the upper units tied to a wall or other structure to prevent tipping.</td></tr>
<tr><td>What is a Lion?
What is a Lion SX, Lion UX, Lion X, Lion XP, Lion UXP?</td><td>Lion is the name for the Clarity displays with model numbers that begin: WN-6720-.
<table>
<tr><th>Name</th><th>Model</th><th>Resolution</th><th>Aspect Ratio</th></tr>
<tr><td>Lion X</td><td>WN-6720-X</td><td>1024 × 768</td><td>4 × 3</td></tr>
<tr><td>Lion SX</td><td>WN-6720-SX</td><td>1280 × 1024</td><td>5 × 4</td></tr>
<tr><td>Lion UX</td><td>WN-6720-UX</td><td>1600 × 1200</td><td>4 × 3</td></tr>
<tr><td>Lion XP</td><td>WN-6720-XP</td><td>1024 × 768</td><td>4 × 3</td></tr>
<tr><td>Lion SXP</td><td>WN-6720-SXP</td><td>1280 × 1024</td><td>5 × 4</td></tr>
<tr><td>Lion UXP</td><td>WN-6720-UXP</td><td>1600 × 1200</td><td>4 × 3</td></tr>
</table>
The term ‘Lion’ refers to any of these.</td></tr>
<tr><td>How does a Lion UXP differ from a Lion UX? Or an XP differ from an X?</td><td>The XP, SXP and UXP have a different lamp system, using two lamps instead of four and a more efficient light transmission system. This produces a brighter picture with better brightness uniformity. They also has a new air filtration. All of this means is that some of the menus in Lion XP, Lion SXP and Lion UXP are different from previous Lions, but most menus are the same.</td></tr>
<tr><td>How much does a Lion weigh?</td><td>A fully assembled Lion weighs 247 lbs. (113 kg)
The screen weighs 48 lbs. (22 kg)
The lower section weighs 98 lbs. (45 kg)
The upper section weighs 101 lbs. (46 kg)</td></tr>
<tr><td>What is the operating temperature range?</td><td>0° to 35°C (32° to 95° F). The ambient air temperature, that is, the temperature of the incoming air, should not be higher than this.</td></tr>
<tr><td>What kinds of inputs does the Lion accept?</td><td>Computer: UXGA, 1600 × 1200; SXGA, 1280 × 1024; XGA, 1024 × 768; SVGA, 800 × 600; VGA, 640 × 480.
Note: Lion X, XP and Lion SX will accept resolutions up to 1600 × 1200 and down convert them to their (lower) native resolution.
Video: (optional) NTSC, PAL, SECAM in either composite or S-Video.
Digital Computer: DVI at the Computer resolutions noted above.
RGB: Separate H&V sync, composite sync, or sync on green at any of the computer or video scan rates.
A complete list of analog input modes is given in ’Using Analog Computer Sources’ on page 46.</td></tr>
<tr><td>What options are available for the Lion?</td><td>VIM: Video Input Module; accepts NTSC, PAL and SECAM in composite or S-Video.
BP: Clarity’s Big Picture™; lets you spread one picture over multiple displays, as in a video wall.</td></tr>
<tr><td>What is Clarity’s Big Picture™?</td><td>Clarity’s Big Picture™ option spreads one picture source over all (or some) of the displays in a wall. In a 3 × 3 wall, each of the nine Lions gets the same picture by looping one source through all inputs. When Clarity’s Big Picture is set up and turned on, each cube displays the correct section of the picture to produce one large picture covering the whole wall.
Note that Clarity’s Big Picture uses all the resolution available. In a 2 × 2 wall of Lion X cubes with a UXGA picture source, the displays will use the resolution of the source, each display using an 800 × 600 quarter of the original.</td></tr>
</table>

Does the wall have to be square to use Clarity's Big Picture™?	No, it can be any rectangular shape: 2 × 4, 6 × 1, etc., up to 32 × 32.
Do I have to use the whole wall to use Clarity's Big Picture™?	No. In a 4 × 4 wall, you can arrange it as one picture covering the whole thing, or as four 2 × 2s each with a separate picture, or as a 3 × 3 in one corner with five separate pictures surrounding this, or as two 4 × 1s (4 high, 1 wide) at each side and two 2 × 2s in the middle. Each of these configurations can be stored separately in memory and recalled instantly.
Can I tilt the wall of Lions?	Yes, up to 15° forward, backward or to either side. However, it must be installed to give service people rear access.
Can I make a curved wall of Lions?	The Lion was designed for a flat wall. The screen brackets and other interconnecting parts require a flat wall. Curved walls would have to be custom designed by you.
How much power does a Lion use?	It depends on how many lamps you are using. For 2 lamps, the maximum power is 690 W. See the table 'Maximum Current and Power Used By One Lion' on page 14 or 'Specifications' on page 208 for a complete list
How many lamps does it use?	The Lion UXP has two (2) lamps, but you can use one if you wish.
What is the aspect ratio of the screen, Width:Height?	4:3, or 1.33 for Lion UXP and XP. Stacking Lions in various ways can give other aspect ratios, as listed in the tables: page 15 and 15
What is the difference between analog computer pictures and DVI?	VGA, SVGA and the rest of this family are analog signals. Each pixel is represented by three voltages, one each for red, green and blue. Anything that affects these voltage levels during transmission and processing changes the brightness or color of the picture. DVI, Digital Video Interface, represents each pixel with a number. The number is sent as a string of binary digits, or bits. Things that change the voltage level of the bits do not change the picture, unless these changes are very severe.
If I don't have DVI picture sources, can I still use its advantages?	Yes. Connect any analog source picture—VGA, SVGA, SXGA, NTSC, S-Video, RGBS—to the appropriate input connector of the first display. Then connect the first display's Digital Output connector to the next display's Digital Input connector. Continue in this way to connect the other displays.
How many displays I can connect in this way?	No loop-thru system can continue forever without some signal degradation. The details of these limits, and how to work around them, are given in 'The Limits of Loop-Thru' on page 54.
Can all servicing be performed from the front? From the rear?	All servicing can be performed from either the front or the rear. However, for display walls that tilt forward from vertical, rear servicing is required, and front servicing is not possible.
How much space do I have to leave behind the displays?	At least 8", 200 mm. Additional space may be needed, depending on the cooling system available and your need to service from the rear. If the wall is tilted, there must be enough space for a person to stand and work behind the displays.
Why does a tilted wall need to be serviced from the rear only?	When the wall is tilted, the screens are screwed into place from the rear. This is a safety requirement. You cannot remove the screen from the front when these screws are used, so you have to work from the rear.
What tools do I need for installation?	#2 Phillips screwdriver Large, flat-blade screwdriver Socket wrench set with a" socket
What does 'cube' mean?	One WN-6720; one Lion of any type.
What does 'wall' mean?	A stack of Lions bolted together. A list of terms used in this manual is in 'Glossary of Terms' on page 200.

2.2 Your Personal Safety Is Important

The WN-6720 is heavy. It sometimes contains very high voltages. It produces UV (ultra-violet) radiation, and in some parts, it is very hot. If your physical health and safety mean nothing to you, you may skip this section and take your chances. More sensible people will take two minutes to read this section at least once.

The fully assembled display weighs about 247 lbs (113 kg), which is why you assemble it by parts as you build the wall.

The individual pieces are not light, either:

- lower section, 98 lbs, 45 kg.
- top section, 101 lbs, 46 kg.
- screen, 48 lbs, 22 kg.

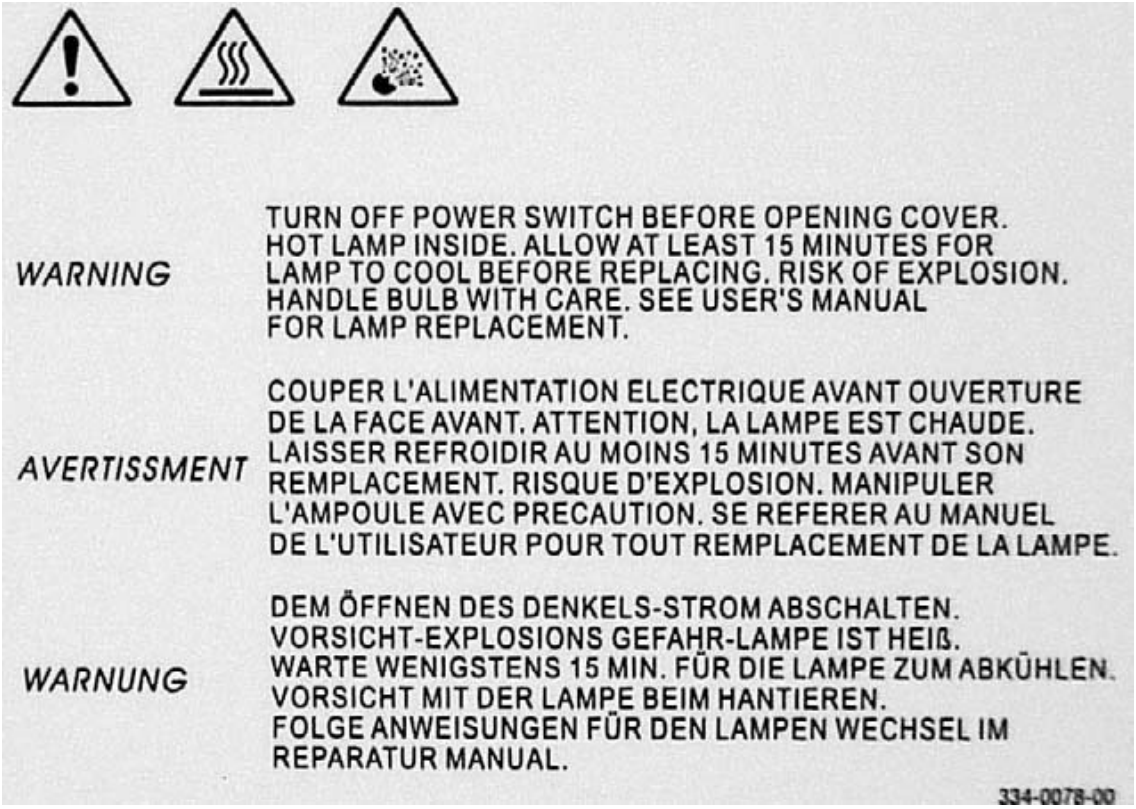
These pieces are large and awkward to handle. Never lift or move pieces alone. Always have at least two people.

When assembling a wall, you will need more than two people to handle and control the sections.

- The lamps need very high voltages to ignite, around **20,000 volts**.
- The lamps produce lots of light and **UV radiation** (ultra-violet) as well. UV light can damage your retinas. After the light leaves the lamps and passes through the LCD, there is no more UV.
- The **screen** is heavy (about 50 lbs) and made of glass. Breakable glass. Treat it with care. Always handle the screen with two people. When it is not on the display, keep it in a safe place, where it will not be hit, and no one will lean against it.
- There is no electrical interlock on the screen. Opening the screen does *not* turn off the high voltage to the lamps. The Lamp Bay door has an intrusion switch; opening this door shuts off the lamps.

✎ The plug on the power cord serves as the disconnect for this product.

✎ Der Netzstecker dient bei diesem Produkt als Trenneinrichtung vom Stromversorgungsnetz.


WARNING
TURN OFF POWER SWITCH BEFORE OPENING COVER.
HOT LAMP INSIDE. ALLOW AT LEAST 15 MINUTES FOR
LAMP TO COOL BEFORE REPLACING. RISK OF EXPLOSION.
HANDLE BULB WITH CARE. SEE USER'S MANUAL
FOR LAMP REPLACEMENT.
AVERTISSMENT
COUPER L'ALIMENTATION ELECTRIQUE AVANT OUVERTURE
DE LA FACE AVANT. ATTENTION, LA LAMPE EST CHAUDE.
LAISSER REFROIDIR AU MOINS 15 MINUTES AVANT SON
REMPLACEMENT. RISQUE D'EXPLOSION. MANIPULER
L'AMPOULE AVEC PRECAUTION. SE REFERER AU MANUEL
DE L'UTILISATEUR POUR TOUT REMPLACEMENT DE LA LAMPE.
WARNUNG
DEM ÖFFNEN DES DENKELS-STROM ABSCHALTEN.
VORSICHT-EXPLOSIONS GEFAHR-LAMPE IST HEIß.
WARTE WENIGSTENS 15 MIN. FÜR DIE LAMPE ZUM ABKÜHLEN.
VORSICHT MIT DER LAMPE BEIM HANTIEREN.
FOLGE ANWEISUNGEN FÜR DEN LAMPEN WECHSEL IM
REPARATUR MANUAL.
334-0078-00

WARNING
Hazardous voltage inside.
Can shock, burn or cause death.
Disconnect power cord before servicing this unit.
Refer to service manual for details.
No user serviceable parts inside.
Refer all service to qualified serviceman.
334-0100-00

WARNING
High intensity light.
Do not look into the projection lens while unit is on.
WARNING
Possible UV Exposure
Use protective eye wear while operating with screen removed.
334-0077-00

2.3 Power Consumption and Dimensions

For complete specification details, see 'Specifications' on page 208.

Maximum Current and Power Used By One Lion

	2 lamps (690 W)	1 lamp (460 W)
Voltage	**Amps**	**Amps**
230 V	3.2 A	2.2 A
115 V	6 A	4 A

Air Conditioning Required for Various Lion Wall Configurations																	
		Number of displays															
# of lamps used		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**12**	**14**	**15**	**16**	**18**	**20**
Tons A/C	**1**	0.10	0.20	0.29	0.39	0.49	0.59	0.69	0.79	0.88	0.98	1.18	1.37	1.47	1.57	1.77	1.96
required	**2**	0.18	0.36	0.54	0.72	0.90	1.08	1.26	1.44	1.62	1.80	2.16	2.52	2.70	2.88	3.24	3.60
Heat, 1000	**1**	1.2	2.4	3.5	4.7	5.9	7.1	8.2	9.4	10.6	11.8	14.1	16.5	17.7	18.9	21.2	23.6
BTU/hr	**2**	2.2	4.3	6.5	8.6	10.8	13.0	15.1	17.3	19.5	21.6	25.9	30.3	32.4	34.6	38.9	43.2

Size and aspect ratios of several wall configurations
for Lion UXP and XP in inches

Wall size			Aspect ratio of screen (height:width)		Size (inches)			
High	Wide	Total	1 : ?	W : H	Screen height	Screen width	Wall height	Wall width
1	1	1	1.333	4:3	40.2	53.6	58.4	53.6
1	2	2	2.667	8:3	40.2	107.2	58.4	107.2
2	1	2	0.667	3:2	80.4	53.6	98.6	53.6
1	3	3	4.000	1:3	40.2	160.8	58.4	160.8
3	1	3	0.444	4:9	120.6	53.6	138.8	53.6
1	4	4	5.333	16:3	40.2	214.4	58.4	214.4
4	1	4	0.333	1:3	160.8	53.6	179	53.6
2	2	4	1.333	4:3	80.4	107.2	98.6	107.2
2	3	6	2.000	2:1	80.4	160.8	98.6	160.8
3	2	6	0.889	8:9	120.6	107.2	138.8	107.2
2	4	8	2.667	8:3	80.4	214.4	98.6	214.4
4	2	8	0.667	2:3	160.8	107.2	179	107.2
3	3	9	1.333	4:3	120.6	160.8	138.8	160.8
3	4	12	1.778	16:9	120.6	214.4	138.8	214.4
4	3	12	1.000	1:1	160.8	160.8	179	160.8
4	4	16	1.333	4:3	160.8	214.4	179	214.4

Size and aspect ratios of several wall configurations
for Lion UXP and XP in millimeters

Wall size			Aspect ratio of screen (height:width)		Size (mm)			
High	Wide	Total	1 : ?	W : H	Screen height	Screen width	Wall height	Wall width
1	1	1	1.333	4:3	1021	1361	1481	1361
1	2	2	2.667	8:3	1021	2723	1481	2723
2	1	2	0.667	3:2	2042	1361	2502	1361
1	3	3	4.000	1:3	1021	4084	1481	4084
3	1	3	0.444	4:9	3063	1361	3523	1361
1	4	4	5.333	16:3	1021	5446	1481	5446
4	1	4	0.333	1:3	4084	1361	4545	1361
2	2	4	1.333	4:3	2042	2723	2502	2723
2	3	6	2.000	2:1	2042	4084	2502	4084
3	2	6	0.889	8:9	3063	2723	3523	2723
2	4	8	2.667	8:3	2042	5446	2502	5446
4	2	8	0.667	2:3	4084	2723	4545	2723
3	3	9	1.333	4:3	3063	4084	3523	4084
3	4	12	1.778	16:9	3063	5446	3523	5446
4	3	12	1.000	1:1	4084	4084	4545	4084
4	4	16	1.333	4:3	4084	5446	4545	5446

2.4 How To Use Menus and Diagnostics

For most of the setup and control you will use the remote control to open menus and read them.

The **remote control** works much like a remote control for a TV or VCR, but it does more. It opens menus, changes values, moves the image, balances colors, sets up Clarity's Big Picture™, and zooms the picture.

You can setup and adjust the displays with the remote or with RS232 commands. In most cases you do initial setup and adjustment with the remote, as explained here.

You have several ways to determine the state of the Lion, whether it is working properly.

- The Status menus tell you about the current state of the lamps and other things, but the lamps must be on to see these menus. Pressing the MONITOR button several times lets you see all these menus. See 'Reading the Status Menus' on page 24.
- The On-Screen Diagnostic Codes flash two bright spots on the screen in a code. This code tells you the most important information when the lamps won't light. Pressing the MONITOR button *once* turns on this code. See 'Reading On-Screen Diagnostic Code' on page 22.
- The Diagnostic LEDs, on top of the electronics module, can be seen from the front or the rear. The LEDs can each show three colors: green, red and amber, although not all three colors are used by each one. (You have to be looking straight down at them to see the amber color clearly.) These also can indicate why the lamps won't light. See 'What the Diagnostic LEDs Can Tell You' on page 20.

If the AC power is on, press MONITOR once on the remote control to see the first of the Status menus. If the lamps are *not* lit, you won't be able to see any of Status menus, but you will see the On-Screen Diagnostic Code.

If the lamps are lit, pressing the MONITOR button several times will step through all the status menus.

You can see the Diagnostic LEDs when you open the screen. You can also see them from the rear when you open the cover of the Electronics Bay.

- To see the **Status menus**, press MONITOR on the remote several times to step through them all. See 'Reading the Status Menus' on page 24
- To see the On-Screen Diagnostic Code**s**, press MONITOR *once*. This turns on the blinking code whether the lamps are lit or not. See 'Reading On-Screen Diagnostic Code' on page 22
- To see the Diagnostic LEDs, look in the Electronics Bay from the front or rear. From the rear, lift or remove the Electronics Bay cover. See 'What the Diagnostic LEDs Can Tell You' on page 20

2.4.1 Using the Remote Control and Menus

Use the remote control to open menus and move through them both to control the display and to read its present state. Some remote control buttons cycle through a menu chain—a group of logically connected controls.

The remote control opens menus on the screen and gives you control of the electronics. The remote has several fast key buttons that go directly to the menus you want.

The fast keys lead you through a **menu chain**, which is a series of menus. Each press of a fast key moves you to the next menu in the chain.

Some of the menu chains are slightly intelligent. They take you through different paths depending on the type of source currently selected.

In all menu chains, the last press of the key turns off the last menu.

Seeing the menus

Press the MENU button on the remote control to open the Main Menu. The up and down arrow buttons on the remote move the highlight bar through the various items. Press ENTER to choose an item.

The ENTER button either activates the current selection or it moves you to the next menu.

Using menu chains

An example of menu chains is shown on the facing page. Pressing the SIZE/POS button on the remote one time opens the Position menu. Pressing it again opens the Zoom Control menu. One more press closes the menus.

You can also go to any of these menus from the main menu. Press MENU. Then use the up-down arrow keys to highlight the menu you want. Press ENTER.

Most menus are accessible from menus chains or from the main menu. Misc Control is an example:

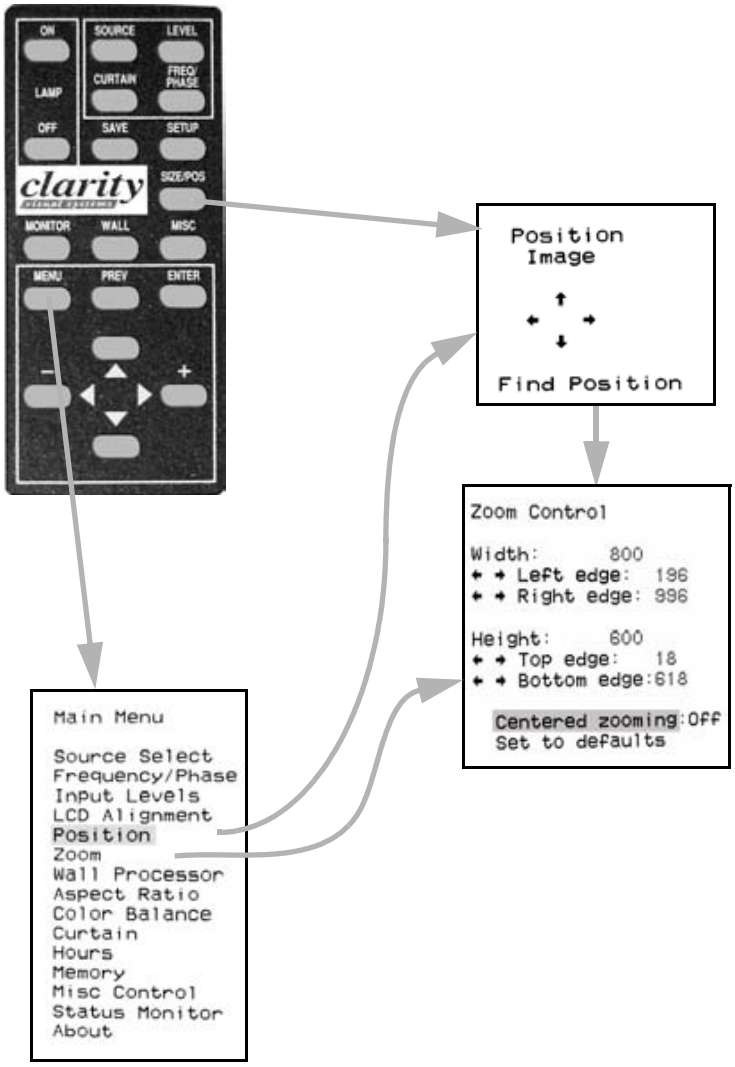
- Press MENU, selecting Misc and pressing ENTER opens a menu from which you can choose other menus.
- Pressing MISC several times opens all the lower level Misc menus one after another.

Sometimes the path through a menu chain depends on the selected source.

Pressing PREV closes the current menu and steps you back through all previously opened menus.

Complete menu chains are shown starting in the Reference Section.

✎ Every time you close a menu, all the settings for the display are saved as the “current” setting. If the AC power is turned off and then turned on again, the display will come back the way it was when the last menu was closed.


ON
SOURCE
LEVEL
LAMP
CURTAIN
FREQ/ PHASE
OFF
SAVE
SETUP
clarity
SIZE/POS
MONITOR
WALL
MISC
MENU
PREV
ENTER
Position
Image
Find Position
Zoom Control
Width: 800
Left edge: 196
Right edge: 996
Height: 600
Top edge: 18
Bottom edge: 618
Centered zooming: Off
Set to defaults
Main Menu
Source Select
Frequency/Phase
Input Levels
LCD Alignment
Position
Zoom
Wall Processor
Aspect Ratio
Color Balance
Curtain
Hours
Memory
Misc Control
Status Monitor
About

2.4.2 What the Diagnostic LEDs Can Tell You

These LEDs on the electronics module can tell you a lot about the system: whether the fans are running, whether any interlocks are open.

The Diagnostic LEDs are on the electronics module. To see the Diagnostic LEDs, open the screen and raise the cover of the center bay. Near the front (screen side) of the electronics module you will see the LEDs.

Lamp LEDs are arranged in the same pattern as the lamps themselves.
- Off: The lamp is off. Lamp ballast power is not applied, and the lamp is not on.
- Green: The lamp is on. Lamp ballast power has been applied, and the lamp is lit (has not failed).
- Amber: The lamp is not yet on. Lamp ballast power is applied, but the lamp is not lit.
- Red: The system tried to turn on the lamp, but lamp would not light. Lamp ballast power is not applied, and the lamp did not light the last time it tried to light. The system will not try this lamp again until the lamps are cycled off, then on.

When lamps are turned on, the electronics module assumes that both lamps are good (have not failed). When a lamp is marked as failed (red LED), the electronics module will not try that lamp again until both lamps are turned off, then on.

Fan LEDs indicate the fan's state. To turn on any lamps, *all* fans must be working.
- Green: This fan is running.
- Amber: This fan failed, but it is now working again.
- Red: This fan failed, and it caused the lamps to go out. Lamps cannot be lit.

Standby is green when the lamps are ready to light and the display is waiting for an ON command. It is normally off.

Interlock: A switch opens when the Lamp Bay door opens. The Interlock LED turns red and the lamps will not light. If the lamps were lit, they go off immediately. The Interlock LED will turn green when the Lamp Bay door is closed again. See Lockout below.

Lockout is red whenever the Interlock LED turns red. As long as it is red, you cannot light the lamps. The only way to turn off the Lockout LED is to cycle the AC power off, then on again. When AC power comes back, the Lockout LED will be off *provided the condition that caused the lockout has been corrected.* These events cause a Lockout condition:
- Lamp Bay door opens
- any fan stops when it should be on
- overtemp condition occurs, if Temperature Monitoring is on
- both lamps fail

Lockout is green for about 15 seconds after AC power is applied and again immediately after you turn off all lamps. Lamps cannot be turned on during this period.

Temperature: There are four temperature sensors; lamps, power supply, electronics module board, and Air Intake Bay. If any of these exceed a preset limit, this LED turns red. If it approaches close to the limit but does not exceed it, you are warned by an amber LED.

RS232 Data: Stays on green for one second every time an RS232 command is received, whether or not the command was addressed to this cube.

RS232 CMD: Stays on green for one second every time an RS232 command is received that was *addressed to this cube*, whether it is a global command addressed to all cubes, a specific command: for this cube only, or a command meant for a group that includes this cube.

Remote IR: This LED flickers whenever IR radiation is detected, indicating that a command is being received from the remote, or that there is stray IR from other sources in the area. This LED flickers very briefly, so it is sometimes hard to see.

Power supply LED

The power supply has an LED on it labeled 'BALLAST POWER.' It indicates that the 350-volt supply for the lamp ballasts is working.

LEDs on the front edge of the electronics module as seen from the **rear**.

As seen from the **front**

LED Indicators on the Electronics Module

LED	Off	Green	Red	Amber
Lamps	Off	On	Failed: shows red only if Lamp Control is on; otherwise it is amber when the lamp fails.	Striking, but not lit yet. If Lamp Control is off, and the lamp has failed, the LED will remain amber.
Fans	Off	Running	Failed; all lamps shut off	Failed previously; OK now.
Interlock		Normal; interlocks closed	Lamp Bay cover open or thermal cutoff open.	
Temperature		Normal	Temperature exceeded limit	Temperature approach-ing limit
RS232 Data		On green for one second when any RS232 data is received		
RS232 CMD		On green for one second when data for this cube is received		
Remote IR		Flickers whenever IR is detected from any source, including Remote		
Standby	Normal (lamps on)	Ready for Lamp ON command		
Lockout	Normal (Standby or lamps on)	Lamps can't be lit during this time; wait.	An interlock or other failure event occurred. You must cycle power to reset this Lockout.	
Source		Normal; valid source detected	Source not valid or no source	Testing for sync type

2.4.3 Reading On-Screen Diagnostic Code

*When the lamp won't light, this is **the fastest way** to learn why. Press the* MONITOR *button on the remote to see this code.*

The On-Screen Diagnostic Code lets you trouble-shoot, even when the lamp won't ignite. This code is a brief series of lights of two colors that appear on the screen. These lights blink in a simple code, shown on the facing page.

The code is built so you can read it even if you are color blind. One color always stays on three times as long as the other, so you can read the code by the sequence of colors or by the time sequence.

To start the On-Screen Diagnostic Code, press the MONITOR button.You will immediately see the LEDs on the screen. The tables show the patterns of the codes and what they mean. If the lamps are on, you will also see the Cube Status menu.

To stop the On-Screen Diagnostic Code, press the MONITOR button again. The Status menu goes away.

Auto Codes will turn on the On-Screen Diagnostic Codes automatically if the system goes into lockout for any reason. They will turn off when the lamps are turned on. Auto Codes can be turned on or off in the Miscellaneous menu.

The **Priority** rating in the table shows which problems are most important. If there are two problems, only the pattern with the lower number will show in the code. When this problem is fixed, the next problem will show in the code.

Lion UXP On-Screen Diagnostic Codes

	Condition	Priority	Each block represents 0.2 seconds
Starts with Red Lamps turn off.	Lamp Bay door open	1	R ▯ R ▯ R ▯ ▯ ▯ ▯ ▯ ▯ ▯ ▯ ▯ ▯
	Any Fan stopped	2	R ▯ Amber ▯ ▯ ▯ ▯ ▯ ▯ ▯ ▯ ▯
	350 V missing	3	R ▯ R ▯ Amber ▯ ▯ ▯ ▯ ▯ ▯ ▯
	Sensor overtemp, lamps off [1]	4	R ▯ Amber ▯ R ▯ ▯ ▯ ▯ ▯ ▯ ▯
	Lockout [2]	5	R ▯ R ▯ R ▯ R ▯ ▯ ▯ ▯ ▯ ▯ ▯
Starts with Amber. Lamps stay on.	Sensor overtemp, lamps not off [3]	6	Amber ▯ R ▯ R ▯ ▯ ▯ ▯ ▯ ▯ ▯
	Lamp failure, either lamp	7	Amber ▯ R ▯ Amber ▯ ▯ ▯ ▯ ▯ ▯
	Sensor approached limit	8	Amber ▯ R ▯ ▯ ▯ ▯ ▯ ▯ ▯ ▯
	Standby state [4]	9	Amber ▯ Amber ▯ ▯ ▯ ▯ ▯ ▯ ▯
	Lamps on, no alarms	10	Amber on continuously

R = Red

[1] Sensor over limit and Temp Monitor is On.

[2] Conditions 1, 2, 3, or 4 will cause Lockout. After fixing the problem, you may see Condition 5, Lockout. You must cycle AC power off, then on, to reset the Lockout condition.

[3] Sensor over limit and Temp Monitor is Off.

[4] Waiting for a Lamp On command.

2.4.4 Reading the Status Menus

The Status Monitor menu chain shows lots of information about the current state of the cube. Even when the lamps are not lit, the Monitor button, which normally start the Status Monitor menu chain, can tell you the most important things about the cube.

To look at all the Status Monitor menus, press MONITOR on the remote. Each press of this button steps to the next status menu. You can go directly to any of the six menus from the main menu. None of these menus have any control over the Lion, so there is no highlight selector in any of them.

Cube Status

- **Display**—model name of this display (Lion UXP) and the resolution of the LCD (1600 × 1200 pixels).
- **Lamp**—current state of the two lamps, Front and Rear.
- **Fans**—current state of each fan.
- **Fan Mon**—whether fan monitoring is on or off. (Service Guide)
- **Lamp Bay Door**—current state of the Lamp Bay door switch (OK means the switch is closed).
- **350V Power**—whether power is available to the lamp ballasts.
- **Interlock**—whether the interlocks are being monitored to shut off the lamps (normally on).
- **LI**—Last Interlock event and the time it occurred. This menu shows that the last event to turn off the lamps was that the Lamp Bay Door was opened. This happened 327 hours and 39 minutes ago in System Time. System Time is accumulated as long as the electronics module is on.

Setup Summary

This is the *current* state of the Lion. Although this looks like the same information as the Save and Recall menus, the values may not be the same as a numbered memory. You, or someone else, might have changed something since a memory was recalled. This is the state of the display right now.

Setup Summary shows the current Color Balance settings, which *are* the ones in the global memory. (Color Balance settings are not saved in individual numbered memories.) It's also a good place to see the RS232 address.

The look of this menu varies depending on the currently selected source.

Serial Status

- Current setting in the Baud Rate menu (page page 138).
- Current RS232 address (page 138).
- Number of bytes Received and Transmitted for each of the four ports. Port 1 is RS232 In and Out. Port 2 is the Load Date and Trace connectors.[1]
- The bottom four rows show Parity errors (not used), Overrun (of UART capacity), Breaks in reception or transmission, and Framing errors on the two ports. Port 1 is used for ordinary control of the cube. Port 2 is for loading new firmware and monitoring the cube's status. Pressing ENTER also resets these counts.

✎ Pressing ENTER in this menu resets all the counts to zero.

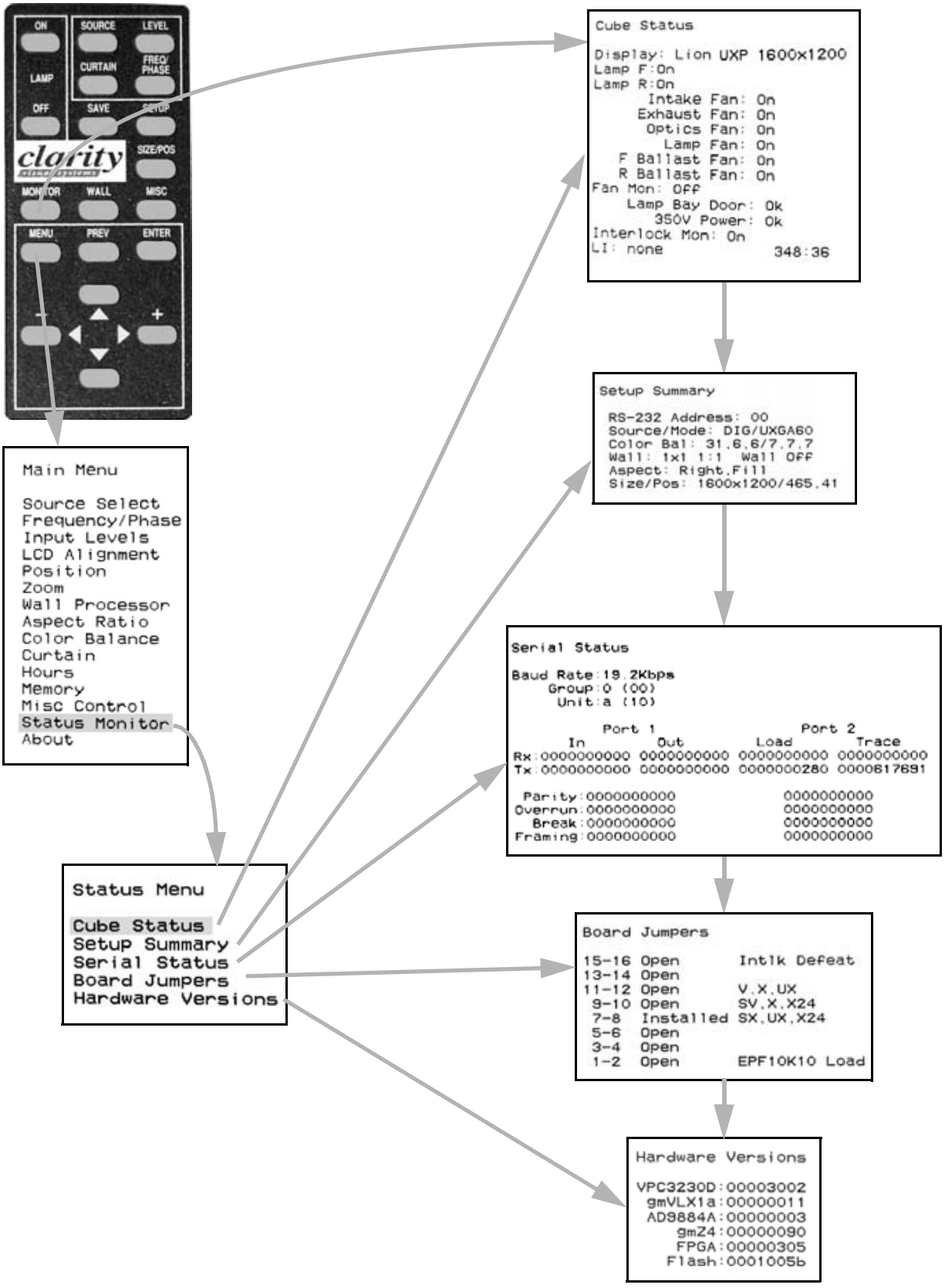
Board Jumpers

These jumpers are on the electronics module board. The right column is a label that shows the state of the jumper: open-installed. None of these jumpers are for user control. They are here for information only.

Hardware Versions

This is for information only. It shows the version of the main chips in the electronics module.

[1] The RS232 Out port might *receive* data from a display further along the serial string and *transmit* this data out the In port, sending it eventually to the controlling computer.


ON
SOURCE
LEVEL
LAMP
CURTAIN
FREQ/ PHASE
OFF
SAVE
SETUP
clarity
SIZE/POS
MONITOR
WALL
MISC
MENU
PREV
ENTER
Main Menu
Source Select
Frequency/Phase
Input Levels
LCD Alignment
Position
Zoom
Wall Processor
Aspect Ratio
Color Balance
Curtain
Hours
Memory
Misc Control
Status Monitor
About
Status Menu
Cube Status
Setup Summary
Serial Status
Board Jumpers
Hardware Versions
Cube Status
Display: Lion UXP 1600x1200
Lamp F:On
Lamp R:On
Intake Fan: On
Exhaust Fan: On
Optics Fan: On
Lamp Fan: On
F Ballast Fan: On
R Ballast Fan: On
Fan Mon: OFF
Lamp Bay Door: Ok
350V Power: Ok
Interlock Mon: On
LI: none
348:36
Setup Summary
RS-232 Address: 00
Source/Mode: DIG/UXGA60
Color Bal: 31,6,6/7,7,7
Wall: 1x1 1:1 Wall OFF
Aspect: Right,Fill
Size/Pos: 1600x1200/465,41
Serial Status
Baud Rate:19.2Kbps
Group:0 (00)
Unit:a (10)
Port 1
Port 2
In
Out
Load
Trace
Rx:0000000000 0000000000 0000000000 0000000000
Tx:0000000000 0000000000 0000000280 0000817691
Parity:0000000000 0000000000
Overrun:0000000000 0000000000
Break:0000000000 0000000000
Framing:0000000000 0000000000
Board Jumpers
15-16 Open Intlk Defeat
13-14 Open
11-12 Open V,X,UX
9-10 Open SV,X,X24
7-8 Installed SX,UX,X24
5-6 Open
3-4 Open
1-2 Open EPF10K10 Load
Hardware Versions
VPC3230D:00003002
gmVLX1a:00000011
AD9884A:00000003
gmZ4:00000090
FPGA:00000305
Flash:0001005b

3 Installing the Lions

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3.1 What You Will Do

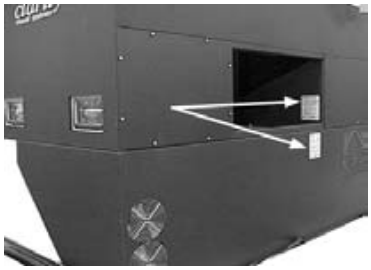
This section is a checklist for people familiar with Lion installation. For others, it is also an outline of the procedures, an overview. The numbers in parentheses are the pages where the procedures are explained in detail.

You can build a video wall up to four units high by any number wide. The displays need 8" (20 cm) of clear space at the rear for ventilation. Tilted walls need more space behind (page 38).

Installation

1. Lay down one row of lower sections (36; page 38 for tilted walls), and align these units *perfectly* level and straight with each other.
2. Cover this row with their top sections (match serial numbers), **bolt the tops to the bottoms**. Assure that the row is **straight and squared** (36 or 38).

Serial numbers should match, top and bottom.



3. Stack another row of lower sections on these and bolt them side to side with the cubes below (36 or 38).
4. Stack a second row of tops and bolt them to their lower sections (36 or 38).
5. Bolt the Screen Brackets on the front (36 or 38).
6. Remove the metal Electronics Bay cover and remove the soft, plastic lens cover (40).
7. Install the hood over the Exhaust Fan (40).
8. Install the Video Input Module (32) and Big Picture keys (30), if these were purchased.
9. Connect power (42), picture source (44-54), and RS232 control cables (56).
10. Install all the screens (58).
11. Turn on AC power in each display.

Configuration

1. Check LCD alignment (70).
2. Select the sources (78).
3. Adjust to computer source frequency and phase (82).
4. Adjust to computer sources (84).
5. Adjust to video sources (86).
6. Set up Big Picture, if you are using this option (94).
7. Set Mode Detect options (120).
8. Adjust picture position (100) and zoom size (102) with Big Picture off.
9. Set up Big Picture, if you are using this option, and aspect ratio (100-102).
10. Adjust picture position (100) and zoom size (102) with Big Picture on.
11. Check and set Lamp Control (68).
12. Check and set the options in Misc Control menus (128).
13. Save your work (108).

Space behind a vertical wall

A vertical wall needs only 8 inches (20 cm) of space behind it. However, this space must not be dead air space. There must be some way for exhaust air from the displays to get away. If the space behind the stack is enclosed or has very poor air circulation, the displays will get too hot.

If the air does not circulate well enough naturally, consider adding a fan behind the stack, or plan A/C venting. The installer is responsible for ensuring that the ambient temperature is always within specifications.

Space behind a tilted wall

For tilted walls—those that lean forward—rear servicing is *essential.* This means there must be enough space behind a tilted wall for a person to stand, kneel, and work.

Setting the ID address

If the wall will be high and large, it may be difficult to adjust the displays using the remote control because of the distance. Many installers prefer to use RS232 commands to adjust the cubes. If you plan to work this way, it is good idea to set the RS232 ID address while the cubes are still on the floor. See 'Controlling the Displays with RS232' on page 138, if you have not done this before.

The MOST IMPORTANT thing to do when assembling a wall of Lions

When you build a wall of Lions, align the first row of lower sections **exactly**. The alignment of the bottom row is critical.

Check the straightness of this row with string stretched very tight. Or use a long carpenter's level. Simply sighting down the row, eye-balling it, is not good enough. The slightest deviations from absolutely straight should be corrected with shims or other means.

Plan to spend half or more of the entire setup time for the whole wall on this one task—getting the first row straight. When the first row is perfectly straight, the rest of the wall goes up easily and the screens will fit well and work well.

About the screen brackets

The screen brackets were designed to do two things:

- assist in aligning the display chassis properly with each other;
- provide alignment points at the corners of the screens.

When a wall has been properly installed, there will be a small gap between the screens; they will not quite touch each other. This is so the screens can be opened and closed easily and not be wedged together tightly with no movement possible.

✎ **Not building a wall?** Even if you use only one Lion, you must still use the UR-LL and UL-LR Screen Brackets as described in the next sections. This assures that the single screen is in the correct position. The image was adjusted at the factory with these brackets installed.

The Lion was designed to build flat display walls, that is, all the screens together produce a flat picture space.

Vertical 2 × 2 wall of Lions using Clarity's Big Picture™ in a conference room.

3.2 Installing the Clarity's Big Picture™ Key

These instructions apply only if you have a Big Picture key. This component is shipped separately and not installed at the factory.

It is easiest to install the Big Picture key while the display is still in the packing case, but you can also do it after the units are assembled. It is not necessary to remove the electronics module from the chassis to install the Decoder Board.

1. If the display is assembled, turn off the AC Switch and remove the power cord.

WARNING
Always remove the power cord when adding a Big Picture key.

1. If the unit is assembled, open the screen or work from the rear. Remove the light shield (cover) in the Electronics Bay.
2. Attach the ground strap to your wrist and clip the other end to a metal part of the main chassis that is not painted.

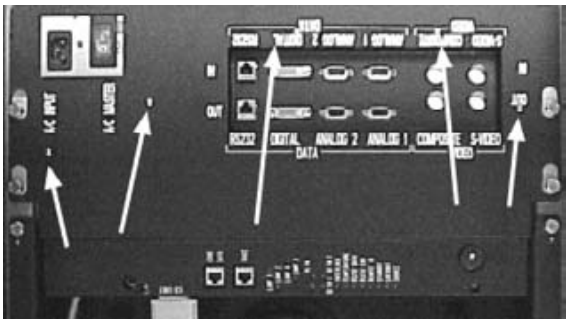
WARNING
Failure to properly use a grounding strap can destroy sensitive electronic components in the electronics module.

3. Remove the LCD Cable connector from the electronics module.

WARNING
If you don't remove the LCD Cable, you will break the printed circuit board in a later step.

4. Remove five screws on the top of the electronics module that hold the cover.
5. Remove the cover of the electronics module.
   a) Lift up very slightly on the edge of the black electronics module cover that is closest to the AC power connector.
      • Move the cover away from the power connector and lift it off.
6. Install the Big Picture key in its connector. The outline around the connector shows you which way it goes in.
7. Reinstall the cover of the electronics module.
   a) Check first to see that all the LEDs are straight up and that none of them are bent over.
   b) Keeping the cover almost flat, hook the cover on the five tabs.
   c) Carefully lay the cover all the way down over the electronics module, watching the LEDs to see that they go in their holes.
8. Screw the cover in place with the five screws.
9. Reconnect the LCD Cable.

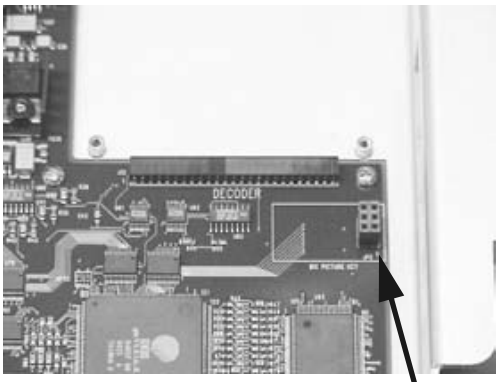
Steps 3. & 7.: Arrows point to LCD cable and connector.



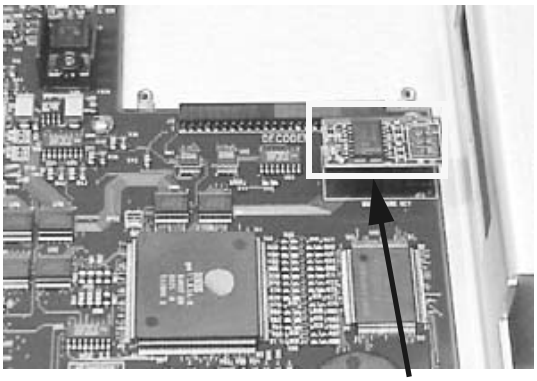
Step 4.: Arrows show locations of five screws that hold the electronics module cover.

Step 5.a: Removing the cover.

Step 5.b: Cover removed.



Step 6.a: Big Picture key connector.



Step 6.b: Big Picture key installed.

3.3 Installing VIM (Video Decoder Module)

These instructions apply only if you have a VIM board. This component is shipped separately and not installed at the factory.

It is easy to install the Decoder Board while the display is still in the packing case, but you can also do it after the units are assembled. It is not necessary to remove the electronics module from the chassis to install the Decoder Board.

10. If the display is assembled, turn off the AC Switch and remove the power cord.

WARNING
Always remove the power cord when adding or removing a Decoder Board.

11. If the unit is assembled, open the screen or work from the rear. Remove the light shield (cover) in the Center Bay.
12. Attach the ground strap to your wrist and the chassis.
    a) Unroll the one-time ground strap.
    b) Wrap the black end of the ground strap around your wrist with the black, sticky strip inside touching your wrist.
    c) Peel the cover off the copper sticky strip at the other end and stick it to an exposed metal part of the electronics module chassis that is not painted.

WARNING
Failure to properly use a grounding strap can destroy sensitive electronic components in the electronics module.

13. Remove the LCD Cable connector from the electronics module.

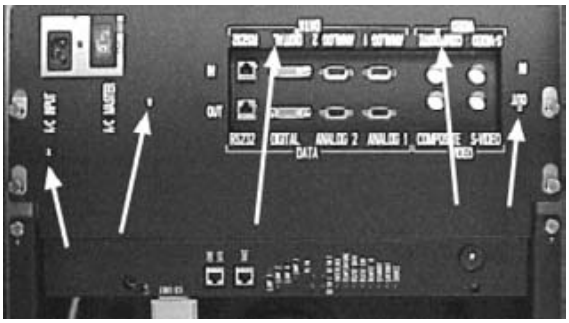
WARNING
If you don't remove the LCD Cable, you will break the printed circuit board in a later step.

14. Remove five screws on the top of the electronics mocule that hold the cover.
15. Remove the cover of the electronics module.
    a) Lift up very slightly on the edge of the black electronics module cover that is closest to the AC power connector.
    b) Move the cover away from the power connector and lift it off.
16. Inspect the Decoder Board to see that all its pins are straight, and plug it into its connector.

✎ If you have to remove the ground strap from your wrist for any reason, be sure to reconnect it before you touch any part of the electronics module.

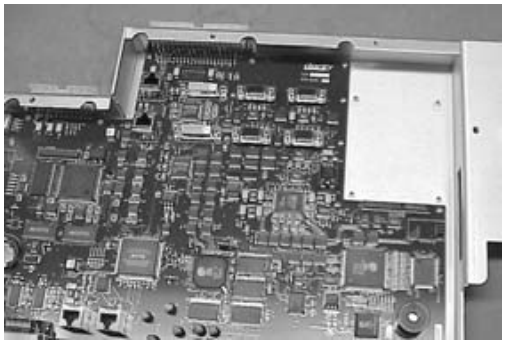
17. Install the four screws that hold the Decoder Board.
18. Reinstall the cover of the electronics module.
    a) Check first to see that all the LEDs are straight up and that none of them are bent over.
    b) Keeping the cover almost flat, hook the cover on the five tabs.
    c) Carefully lay the cover all the way down over the electronics module, watching the LEDs to see that are visible through their holes.
19. Screw the cover in place with the five screws.
20. Reconnect the LCD Cable.

Steps 13. & 18.: Arrows point to LCD cable and connector.

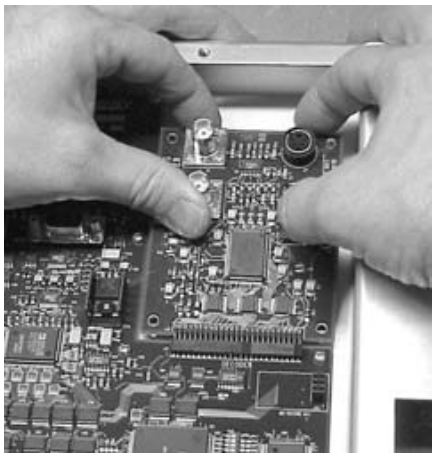


Step 14.: Arrows show locations of five screws that hold the electronics module cover.

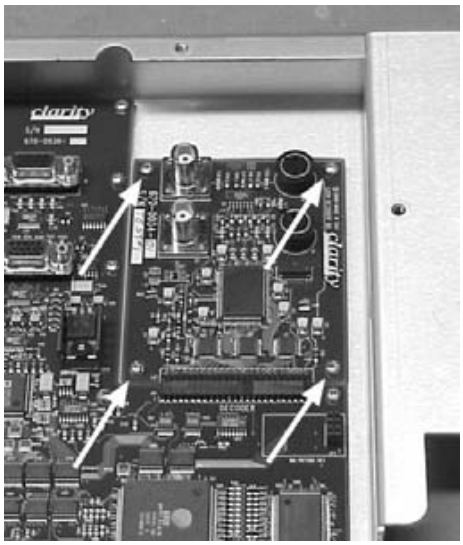
Step 15.a: Removing the cover.



Step 15.b: Cover removed.



Step 16.: Inserting Decoder Board



Step 17.: Arrows show locations of screws that hold the Decoder Board.

3.4 Building a Wall of Lions

Whether the video wall is vertical (Section 3.4.1) or it is tilted forward (Section 3.4.2), this information should help you get the job done efficiently and effectively.

Vertical and tilted walls are built with almost the same steps, so the next two sections are almost identical. Use the section that applies, and take note of these points:

1. The *most* important thing in building a wall is to make the first row straight. Don't be in a hurry to get all the rows stacked up.
   a) Use a tightly stretched string to assure that the row is straight. "Eyeballing" it is not good enough.
   b) If the first row is not straight, the problems just get worse as you go up.
   c) The first row does not have to be *level*, but it must be *straight*.
   d) Plan to spend the time necessary to make the first row straight. It will save time later.
2. Install the screen brackets as the wall goes up and all the screw holes for mounting one of them become available.
   a) Do not use the brackets to *pull* the cubes into place. If it looks like this is necessary, the row is not straight.
   b) If some of the screen brackets do not fit correctly as you build the wall, check the straightness of the bottom row with a stretched string.
   c) The flange, found on some of the brackets, *always* goes to the outside edge of the wall.
3. Side-to-side bolts go through parts of four cubes: the large chassis of the two cubes below and the legs of the two cubes above.
4. Do not hang the screens on any of the cubes until the very end.
5. Be sure to screw the large upper chassis to the lower part (with the legs). There are 10 captive screws in the large upper chassis to do this. If you do not do this, the upper section will fall off when you hang its screen.

The *most* important thing in building a wall is to make the *first row straight*.

3.4.1 To Assemble a Vertical Wall

Build the wall by stacking the pieces separately. Keep the edges straight and flat. Leave at least 8" behind.

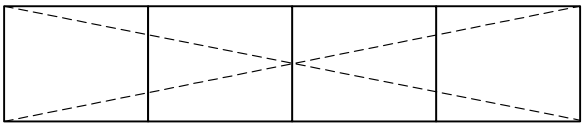
If the wall will tilt forward, stop here and go to 'To Assemble a Tilted Wall' on page 42.

Assembling the first row

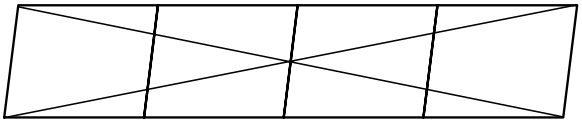
1. Place the lower sections of the display (the smaller pieces) in a line on the floor or on a platform you have provided. Bolt the legs together, side-to-side, using the ¼-20 × 2" bolts, wingnuts, and washers.

✎ If you have not read 'The most important thing to do when assembling a wall of Lions' on page 32, read it now.

2. Set the upper sections with *matching serial numbers* on these lower sections. They fit together with guide pins in the lower section.
3. Bolt them together using the **10 captive bolts** in each upper section. These Phillips-head bolts are inside the upper section, two at the left and right walls, and three at each of the center dividers.
4. Stretch a string parallel to the top and bottom edges to assure that the row is straight. It should be straight horizontally as well as vertically.
5. Use a steel tape to measure the whole wall, which is now only one row high, from corner to corner on both diagonals. If diagonals are the same, the wall is a rectangle with square corners.



If the diagonal measurements are not the same, the wall is skewed.



Use shims under the legs to make corrections.

✎ It is important to get the first row right. Any mistake here will become worse as the wall goes up.

6. Install screen brackets along the bottom:
   a) Top-Bottom Screen Bracket along the bottom wherever two units come together;
   b) UL-LR Screen Bracket in the lower right corner;
   c) UR-LL Screen Bracket in the lower left corner.
7. Stack a another row of lower sections on top of this first row.
8. Bolt the rows loosely side-to-side using the bolts, wingnuts and washers supplied. These bolts go through four displays, the legs of two lower sections and the sides of two upper sections. For end units, use the short bolts and wingnuts that held the sections together during shipping. ('Unpacking the Display' on page 2, Step 5.)
9. Set another row of upper sections and bolt them tightly to their lower sections with 10 captive screws.
10. Install Screen Brackets along the horizontal line between the completed rows:
    a) Center Screen Brackets and
    b) Side Screen Brackets.
11. Again, measure the diagonals of the whole wall. If the tape is not long enough for the whole wall, measure as much as you can diagonally. Make any adjustments needed to make the diagonals equal.
12. Tighten the side-to-side bolts in this row.

Tie back

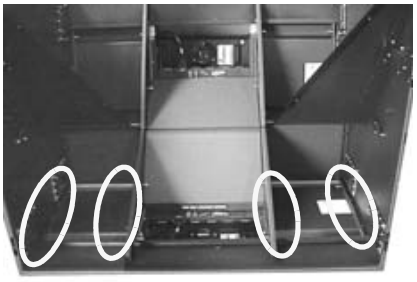
13. Starting with the second row, tie upper units to a wall or other building structure to prevent tipping. Each display has ¼-20 holes in the back for this purpose.

Continue with more rows

14. Repeat steps 7. through 13. until the wall is complete.
15. When the last row is on,
    a) put the Top-Bottom Screen Brackets along the top, and
    b) put the UL-LR Screen Brackets and UR-LL Screen Brackets in the top corners.
16. Check that all the bolts are tight.

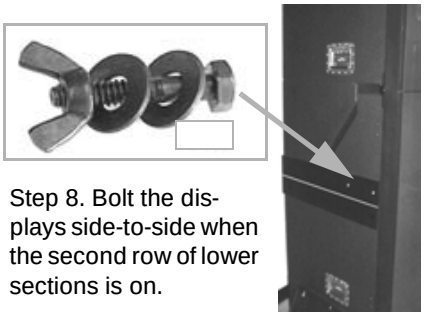
Step 1. Two bottom sections arranged. Check for straight and level. (These units have a custom front panel for appearance.)

Step 2. One top section is on the first row of bottom sections.



Step 3. Tighten the 10 captive screws to hold the two sections together.

Step 7. Start a second row.



Step 8. Bolt the displays side-to-side when the second row of lower sections is on.

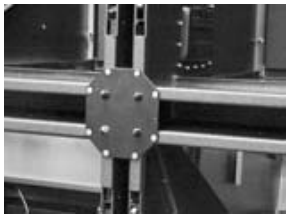
Step 9. The last top section goes on this 2 × 2 wall.

UL/LR Bracket (#4) (also used at lower right corner)

Top Bracket (#3)

UR/LL Bracket (#5) (also used at lower left corner)

Side Bracket (#2)



Center Bracket (#1)

Side Bracket (#2)

Steps 6.**,** 10. **&** 15. Screen brackets. Do not use the brackets to *pull* the units into alignment. They hold the units together and provide screen alignment pins.

Top Bracket (#3) (also used at bottom)

3.4.2 To Assemble a *Tilted* Wall

*You can tilt a wall of Lions **up to 15°** forward. There are several safety issues to consider, and the wall must have enough space behind for a person to stand and work.*

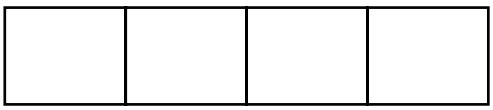
Tilted walls are built almost like vertical walls, but they have these special considerations:

- Stops: Use some method to prevent the base of the bottom unit from sliding forward.
- Tipping: Tie the displays to a supporting wall or other structure to prevent tipping.
- Rear access: The screens on a tilted wall will be bolted closed from the inside, so rear access is essential.

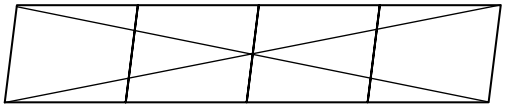
1. Place the lower sections of the display (the smaller pieces) in a line on the floor or on a platform you have provided. Bolt the legs together, side-to-side, using the ¼-20 × 2" bolts, wingnuts, and washers.

✎ If you have not read 'The most important thing to do when assembling a wall of Lions' on page 32, read it now.

2. Prevent the bottom row from slipping forward. This can be done with an angle bracket in front of the legs, or by using an angle bracket at the rear and bolting it to the ¼-20 holes provided near the bottom of the lower section. Bolting at the rear helps prevent tipping.
3. Set the upper sections with matching serial numbers on these lower sections. They fit together with guide pins in the lower section.
4. Bolt them together using the 10 captive bolts in each upper section. These Phillips-head bolts are inside the upper section, two at the left and right walls, and three at each of the center dividers.
5. Stretch a string parallel to the top and bottom edges to assure that the row is straight. It should be straight horizontally as well as vertically.
6. Use a steel tape to measure the whole wall, which is now only one row high, from corner to corner on both diagonals. If diagonals are the same, the wall is a rectangle with square corners.



If the diagonal measurements are not the same, the wall is skewed.



Use shims under the legs to make corrections.

✎ It is important to get the first row right. Any mistake here will become worse as the wall goes up.

7. Install screen brackets along the bottom:
   a) Top-Bottom Screen Bracket along the bottom wherever two units come together;
   b) UL-LR Screen Bracket in the lower right corner;
   c) UR-LL Screen Bracket in the lower left corner.
8. Stack a another row of lower sections on top of this first row.
9. Bolt the rows loosely side-to-side using the bolts, wingnuts and washers supplied. These bolts go through four displays, the legs of two lower sections and the sides of two upper sections. For end units, use the short bolts and wingnuts that held the sections together during shipping. ('Unpacking the Display' on page 2, Step 5.)
10. Set another row of upper sections and bolt them tightly to their lower sections with 10 captive screws.
11. Install Screen Brackets along the horizontal line between the completed rows:
    a) Center Screen Brackets and
    b) Side Screen Brackets.
12. Again, measure the diagonals of the whole wall. If the tape is not long enough for the whole wall, measure as much as you can diagonally. Make any adjustments needed to make the diagonals equal.
13. Tighten the side-to-side bolts in this row.

Tie back

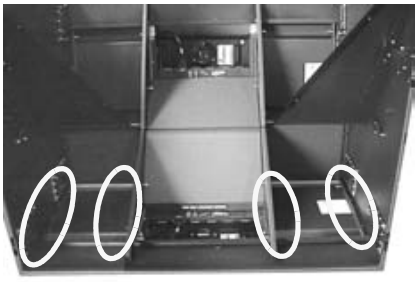
14. Starting with the second row, tie upper units to a wall or other building structure to prevent tipping. Each display has ¼-20 holes in the back for this purpose. *This is particularly important with tilted walls.*

Continue with more rows

15. Repeat steps 8. through 14. until the wall is complete.
16. When the last row is on,
    a) put the Top-Bottom Screen Brackets along the top, and
    b) put the UL-LR Screen Brackets and UR-LL Screen Brackets in the top corners.
17. Check that all the bolts are tight.
18. Tie back the top row.

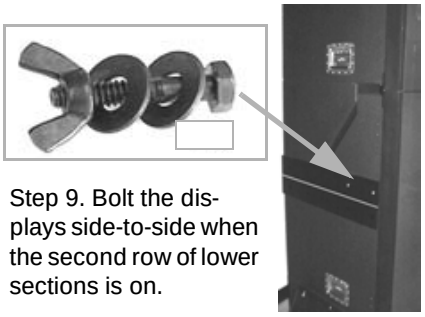
Step 1. Two bottom sections arranged. Check for straight and level. (These units have a custom front panel for appearance.)

Step 3. One top section is on the first row of bottom sections.



Step 4. Tighten the 10 captive screws to hold the two sections together.

Step 8. Start a second row.



Step 9. Bolt the displays side-to-side when the second row of lower sections is on.

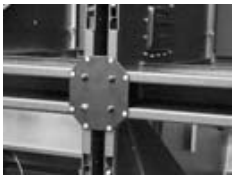
Step 10. The last top section goes on this 2 × 2 wall.

UL/LR Bracket (#4) (also used at lower right corner)

Top Bracket (#3)

UR/LL Bracket (#5) (also used at lower left corner)

Side Bracket (#2)



Center Bracket (#1)

Side Bracket (#2)

Steps 7.**,** 11. **&** 16. Screen brackets. Do not use the brackets to *pull* the units into alignment. They hold the units together and provide screen alignment pins.

Top Bracket (#3) (also used at bottom)

3.5 Next Steps in Building a Wall

Just to be sure everything was done properly, go through this quick checklist. Then do the next few steps.

Check list

So far, all these items should be complete for all displays in the wall:

- ☐ Cubes bolted together, side-to-side, through legs of cube above.
- ☐ All upper sections screwed to lower sections with 10 captive screws.
- ☐ Screen brackets at all four corners of each cube.
- ☐ Flanges on screen brackets appear *only* on the outside edges of the complete wall, never on top or bottom of the wall.
- ☐ Diagonal measurement of whole wall is the same in both directions.
- ☐ Screens are ***NOT*** installed.

☐ **Remove the Electronics Bay cover**

When shipped, the Electronics Bay cover is in a position to cover the lens. After you have assembled the display, remove this cover. Later, put it in the operating position.

The cover is held with four spring-loaded pins, two of them visible from the front, and two visible from the rear. You can open it from either front of rear.

You can remove the cover entirely, which makes it easier to work. Be sure to put it in place when you are finished. The cover is a light shield.

⚠ *CAUTION*

If you take the wall or cube apart, be sure to move the Electronics Bay cover to the shipping position. In the operating position, the cover extends below the bottom of the upper section, and if you take the upper section off and set it on the floor, the cover will be damaged.

☐ **Remove the lens cover**.

The lens cover is a soft, plastic cup, usually red. If you want to keep it, put it in the Air Intake Bay.

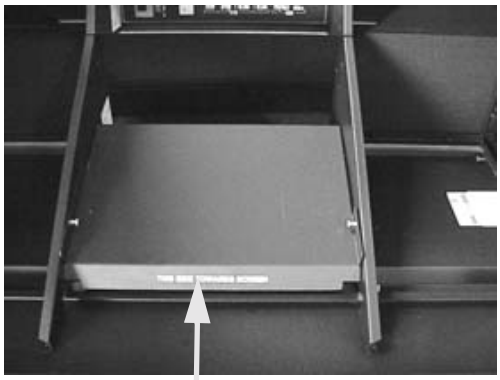
⚠ *CAUTION*

Do not install the screens yet.

☐ **Install the exhaust fan shroud**

The exhaust fan shroud is stored in the Air Intake Bay.

Install the shroud on top of the Lamp Bay cover so the *opening points to the rear*. If the opening points toward the screen, light will leak onto the screen, producing a bright spot. Tighten the captive screws.

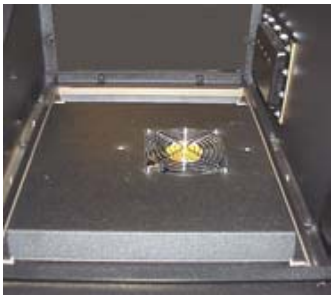


Shipping position: the Electronics Bay cover is in this position covering the lens.
After you assemble the display, move it to the position shown on the right.

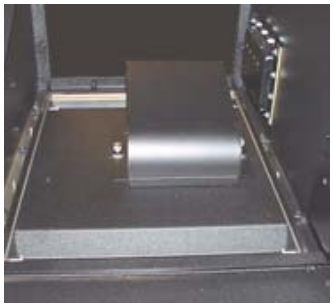
Remove the lens cover.

Open the Air Intake Bay.
Remove and unwrap the exhaust fan shroud.

Exhaust fan shroud, unwrapped



Lamp bay cover without showing exhaust fan **before** shroud is installed, as seen from the front.



Lamp bay cover without showing exhaust fan **after** shroud is installed, as seen from the front.

3.5.1 Connecting Power

Each display may draw up to 6 amps (3 amps at 230 V). The AC Master switch on the power supply module is a circuit breaker, which will trip to the off position in the event of an overload. The power supply is auto-ranging.

Connect a power cable to the power supply and to an AC source. The power supply is auto-ranging, so it works with any source from 100 to 240 VAC, 50 to 60 Hz.

The AC Master switch on the power supply is a circuit breaker.

When the AC Master switch is …	… it means
lit	AC power is available and switch is on.
not lit	switch is off, or no AC is available.

If there is an overload, the circuit breaker switch will move to the OFF position. Reset the breaker by switching it to the ON position.

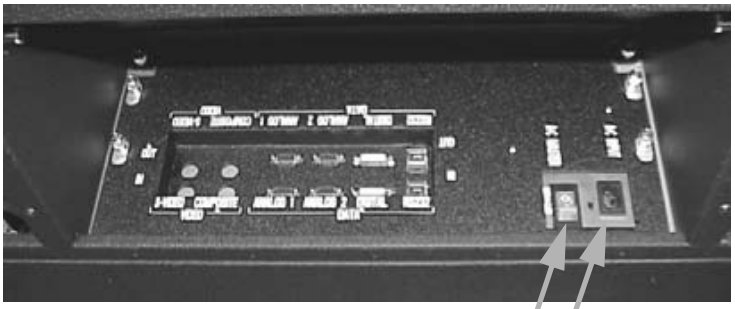
CAUTION

A circuit breaker that trips may be a sign of trouble. Find the trouble first, or call a qualified service person who can find the trouble.

About UPS supplies

Some installations use a UPS—Uninterruptible Power Supply. These will work on the Lion *if* the output of the UPS is a sine wave.

Many UPS systems have square wave or stepped wave outputs. These types will *not* work with Lion. The Lion 350-volt power supply for the lamps requires a sine wave input.


AC Master switch
AC power in

3.5.2 Connecting Picture Sources

The three basic types of inputs are 1) analog computer (UXGA down to VGA), 2) digital computer and 3) video (NTSC, PAL and SECAM, optional). Each of these inputs has a separate loop-thru output. With the DVI the selected input is always available as a digital signal on the Digital Out connector.

The Lion has these connectors for picture sources:

Picture Source Connectors

Picture comes in	Picture goes out
Analog 1	Analog 1 or Digital
Analog 2	Analog 2 or Digital
Digital	Digital
Composite Video*	Composite Video or Digital
S-Video*	S-Video or Digital
*Optional	

DVI, or Digital Video Interface, is a standard for digitally connecting computers to their monitors or for interconnecting any displays.

The Lion converts any of its inputs to the DVI standard and makes this available at the Digital Out connector. This means you can bring in any picture source—UXGA, SXGA, SVGA, NTSC, RGBS—to the first display and connect the rest of the displays in the loop with DVI. The **advantages** of DVI are:

- DVI is less subject to picture degradation than analog methods of loop-thru. (However, even with DVI, loop-thru is not infinite.)
- DVI inputs require much less setup and adjustment. You adjust the picture in the first cube only, the cube with the analog input. Setup time is reduced.

Loop-thru

Loop-thru means to connect the inputs of several displays together in a series string. This makes connections simpler and easier. There are many loop-thrus in the Lion:

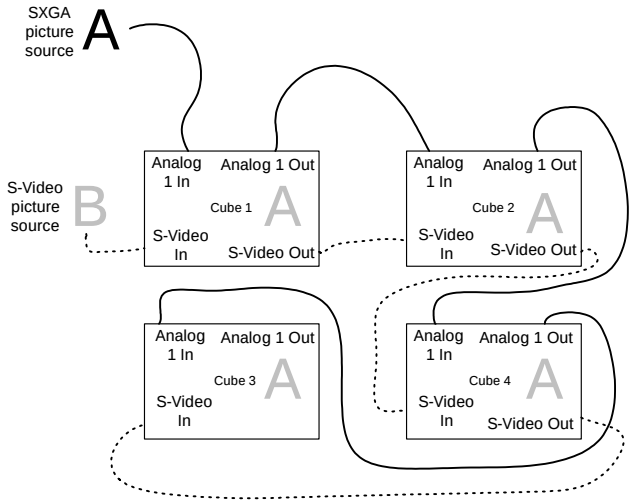
- Analog 1 In is a VGA connector, which accepts computer pictures up to UXGA. It has its own loop-thru called Analog 1 Out. Any picture coming into the Analog 1 In connector comes out the Analog 1 Out connector to the next display. These also accept RGB with separate H & V sync, composite sync, or sync on green.
- Analog 2 In is just like Analog 1 In, and it has its own Analog 2 Out.
- C-Video In (composite video) has its own loop-thru called C-Video Out. These are both BNC connectors.
- S-Video In has its own loop-thru called S-Video Out. These are both 4-pin DIN connectors.
- Digital In has its own loop-thru, Digital Out.

What is special about Digital Out?

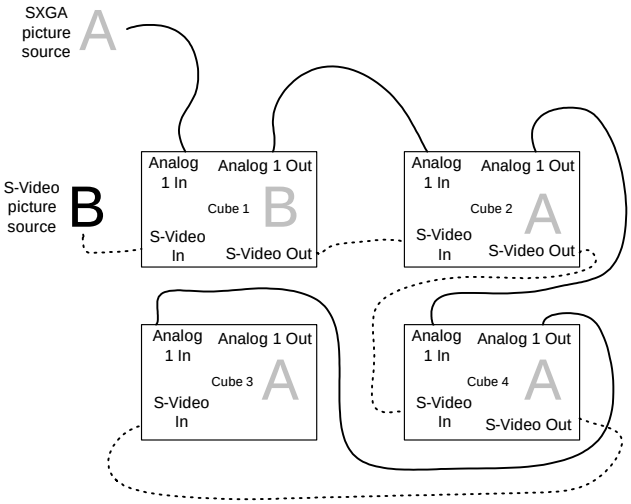
For all the loop-thrus, except Digital, what goes in is what comes out. Whatever goes in Analog 1 In comes out Analog 1 Out; it is not changed in any way, but it is buffered.

Digital Out is different. The *selected* source picture—Analog 1, Digital, S-Video, etc.—is also available at the Digital Out connector as a DVI picture.

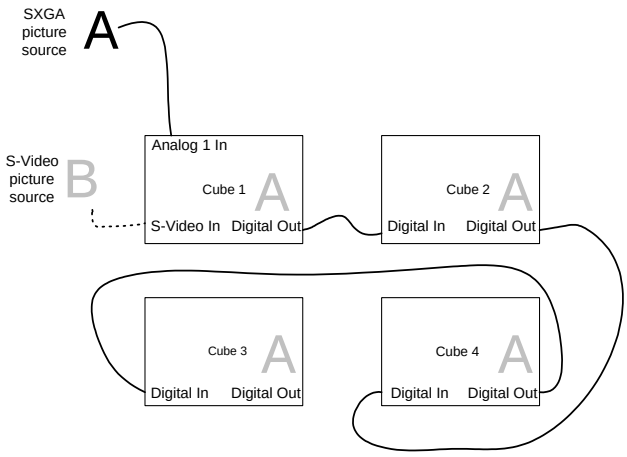
- For Analog 1 Out, Analog 2 Out, C-Video Out and S-Video Out, switching inputs *does not* change what comes from their output connectors. The Analog 2 Out connector always has the same picture as Analog 2 In, regardless of which connector is currently used for the displayed picture. In the upper pair of illustrations, switching from one input to another on the first cube only changes the picture in the first cube, not in the rest of the wall.
- For the Digital Out connector, switching inputs *does* change what comes out of it. The selected picture *always* comes out the Digital Out connector. In the lower illustrations, switching sources in Cube 1 *does* change the picture in the rest of the wall.



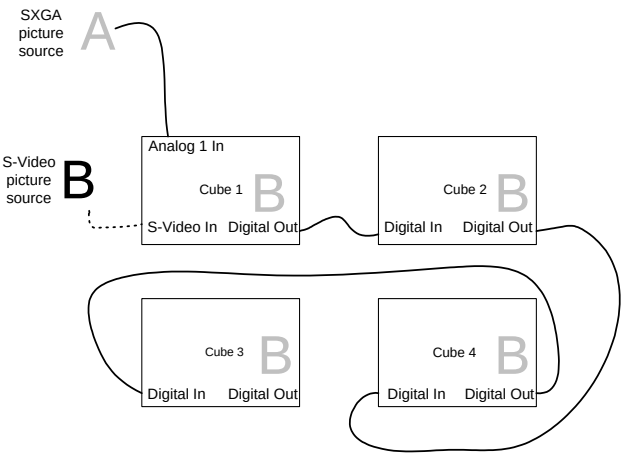
When all cubes have Analog 1 selected as the source picture, all cubes show picture A.



Then Cube 1 (only) selects S-Video as the source picture. Cube 1 shows picture B, but all the other cubes continue to show picture A. Nothing changed for them.



In this digital loop-thru arrangement, Cube 1 selects the Analog 1 input, and all other cubes select Digital In. All cubes show picture A.



Then Cube 1 (only) selects S-Video In, and all other cubes stay with Digital In. All cubes show picture B. Cubes 2, 3 and 4 did not change their input selections, but their pictures changed.

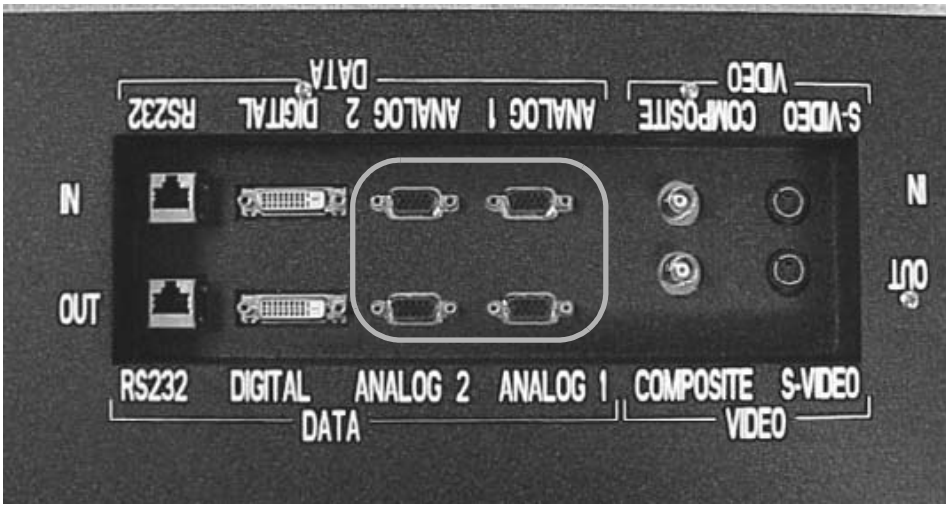
3.5.2.1 Using Analog Computer Sources

These inputs include everything from 1600 × 1200 down to 640 × 480. Analog 1 and Analog 2 are the analog computer input connectors. They have separate outputs.

The two Analog inputs are identical, and each can be separately configured to accept any of the computer resolutions within range.

Each Analog input has a separate, buffered output for loop-thru.

The range of supported computer resolutions, including refresh (vertical) rate, is listed in the table on the facing page.



The electronics module as seen from the front of the display.

Formats Supported at Analog 1, Analog 2 and Digital Connectors

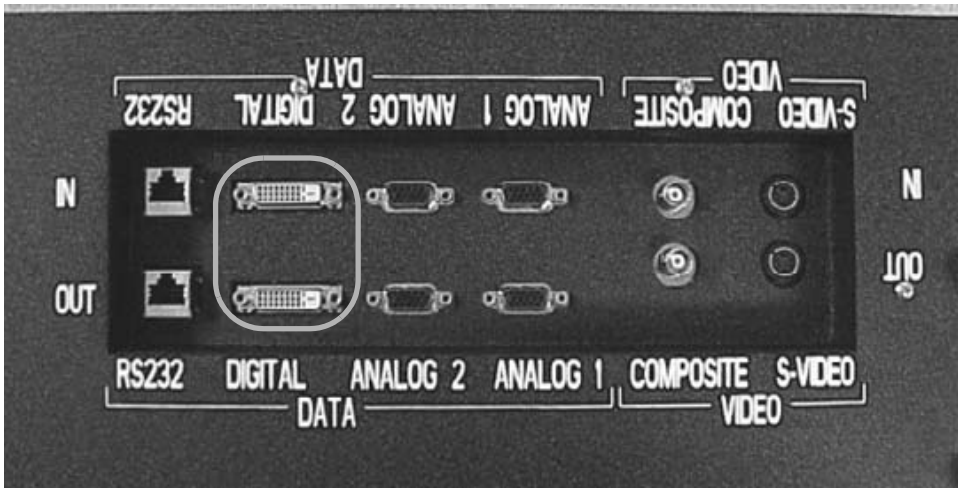
Resolution	Name	Refresh rate (Hz)	H Freq (kHz)	Pixel Freq (MHz)	Pixels per line
640 × 480	VGA	60	31.5	25.175	800
		72	37.9	31.5	832
		75	37.5	31.5	840
		85	43.3	36	832
800 × 600	SVGA	56	35.1	36	1024
		60	37.9	40	1056
		72	48.1	50	1040
		75	46.9	49.5	1040
		85	53.7	56.25	1048
1024 × 768	XGA	60	48.4	65	1344
		70	56.5	75	1328
		75	60.2	78.75	1312
		80	64	85.5	1376
		85	68.77	94.5	1376
1280 × 1024	SXGA	60	64	108	1688
		60 (a)	63.5	109.9	1730
		70	77.4	130.6	1726
		75	80	135	1688
		85	91.1	157.5	1728
1600 × 1200	UXGA	60	75	162	2160
640 × 480	MAC	67	34.97	31.33	859
832 × 624		75	49.72	57.28	1152
720 x 480p	HDTV	60	31.54	27.00	858
1280 × 720p		60	45	74.25	1650
1920 × 1080i		30	33.75	74.25	2200
720 × 400	VESA	70	31.47	28.32	936
720 × 400		85	37.9	35.5	936
1024 × 1024i	1024 × 1024i	60	63.3	89.12	1323
1024 × 1024ni	1024 × 1024ni	60	64.5	88.75	1376
1152 × 900	SUN	66	61.8	92.99	1504
1152 × 900		76	71.73	105.59	1472

3.5.2.2 Using Digital Computer Sources

DVI (Digital Video Interface) connects computers to picture display devices with digital signals. This reduces picture degradation.

The Digital Out connector is different from the others: It does *not* always carry the same picture as the Digital Input.

The picture on the Digital Output is always the picture on the *selected input*. When Analog 1 is selected, the Digital Out connector carries the picture from Analog 1 as a digital picture.



The electronics module as seen from the front of the display.

DDC protocol

The Lion does *not* support the DDC protocol. This protocol provides communication from a display device, such as a computer monitor, to a computer.

Essentially, the computer asks the monitor, “What is the highest resolution you are capable of?” If the monitor says, “SXGA,” the computer will not send UXGA to it.

If your computer source *requires* a response from the display device, it may not function properly with the Lion. You must turn off this requirement in the computer. n

Formats Supported at Analog 1, Analog 2 and Digital Connectors

Resolution	Name	Refresh rate (Hz)	H Freq (kHz)	Pixel Freq (MHz)	Pixels per line
640 × 480	VGA	60	31.5	25.175	800
		72	37.9	31.5	832
		75	37.5	31.5	840
		85	43.3	36	832
800 × 600	SVGA	56	35.1	36	1024
		60	37.9	40	1056
		72	48.1	50	1040
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		85	53.7	56.25	1048
1024 × 768	XGA	60	48.4	65	1344
		70	56.5	75	1328
		75	60.2	78.75	1312
		80	64	85.5	1376
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		60 (a)	63.5	109.9	1730
		70	77.4	130.6	1726
		75	80	135	1688
		85	91.1	157.5	1728
1600 × 1200	UXGA	60	75	162	2160
640 × 480	MAC	67	34.97	31.33	859
832 × 624		75	49.72	57.28	1152
720 x 480p	HDTV	60	31.54	27	858
1280 × 720p		60	45	74.25	1650
1920 × 1080i		30	33.75	74.25	2200
720 × 400	VESA	70	31.47	28.32	936
720 × 400		85	37.9	35.5	936
1024 × 1024i	1024 × 1024i	60	63.3	89.12	1323
1152 × 900	SUN	66	61.8	92.99	1504
1152 × 900		76	71.73	105.59	1472

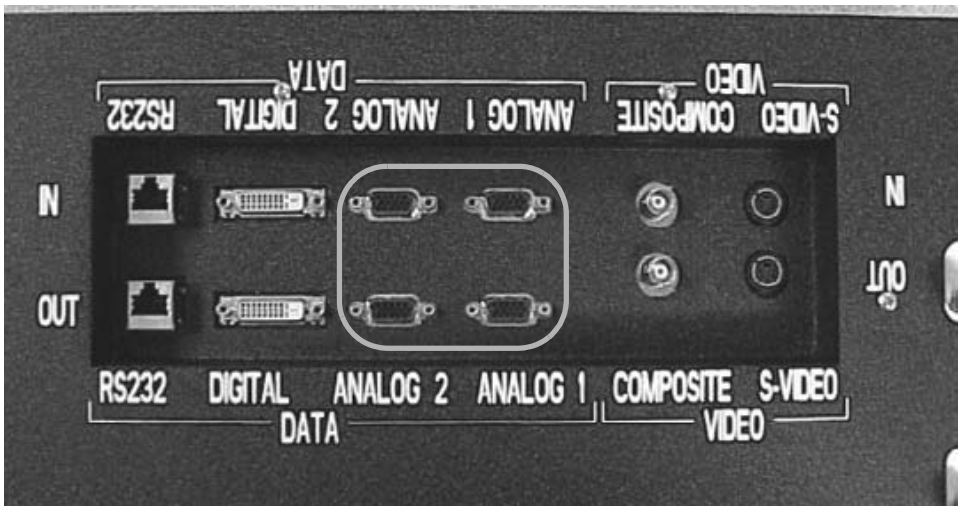
3.5.2.3 Using RGBS Sources

RGBS sources can have composite sync or sync on green. These sources connect to the Analog 1 or Analog 2 connector, but they are handled differently in the Lion.

RGB (or RGBS) signals can have
- composite sync,
- separate H & V sync,
- sync on green,

RGB pictures go into the Analog 1 and Analog 2 inputs. If the RGB comes to the first display on three or four BNC connectors, you will need to provide an adapter to 15-pin.

RGB inputs can be in computer-like format, in which case, the range of acceptable resolutions is the same as for the Analog inputs as shown in the table.

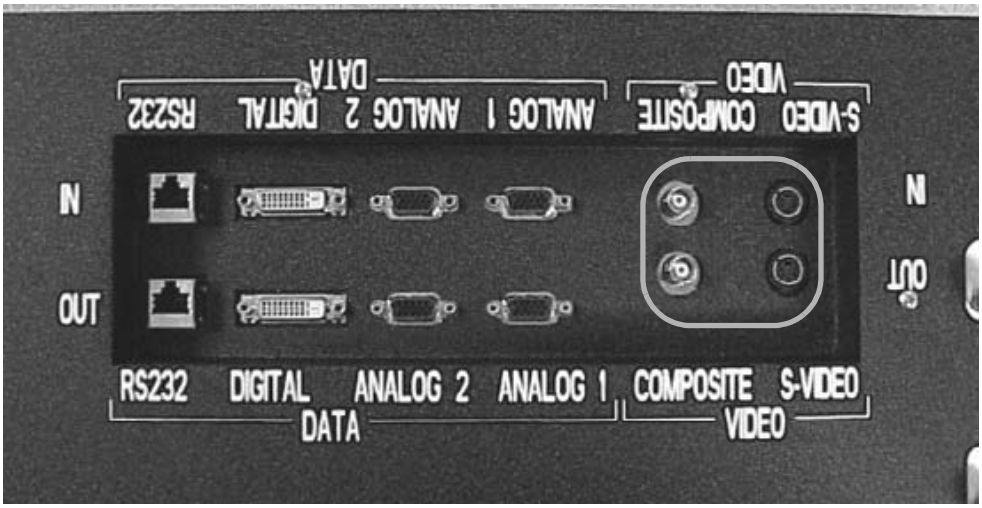


The electronics module as seen from the front of the display.

3.5.2.4 Using Composite and S-Video Sources

Video sources are either C-Video (composite video) or S-Video. Each connector has a separate output. Both C-Video and S-Video accept NTSC, PAL, and SECAM pictures.

If you use S-Video loop-thru, use high quality S-Video cables. Some cables, particularly the ones that come free with VCRs, are low quality. Looping through a series string of these will quickly degrade the picture. The usual effect is loss of chroma (color).



The electronics module as seen from the front of the display.

Video Formats Supported in Composite and S-Video Connectors

Name	Active lines	Vertical rate	Horizontal rate
NTSC	525	60 Hz (59.94)	15.734 kHz
PAL	625	50 Hz	15.25 kHz
SECAM	625	50 Hz	15.25 kHz

3.5.3 The Limits of Loop-Thru

Looping signals through from one display to another is very convenient, but it cannot be done forever. There are several ways to distribute signals to all the cubes without significantly degrading the picture.

You can string displays together, feeding the same analog signal – VGA, SVGA, RGBS, NTSC, PAL, SECAM – to 6 or 8 displays. After that you may see noise and distortion in the picture.

Digital signals—coming into the Digital In connector and looping out the Digital Out—also deteriorate as they are processed again and again in each display. At UXGA rates, after 4 or 5 displays, you may see dropouts and sparkles in the picture.

✎ DVI can often loop-thru to 4 or 5 displays and sometimes more. The number of cubes that can serially loop with Digital In/Out depends on many local factors beyond Clarity's control. There is no guaranty that any specific number of displays can be successfully linked digitally.

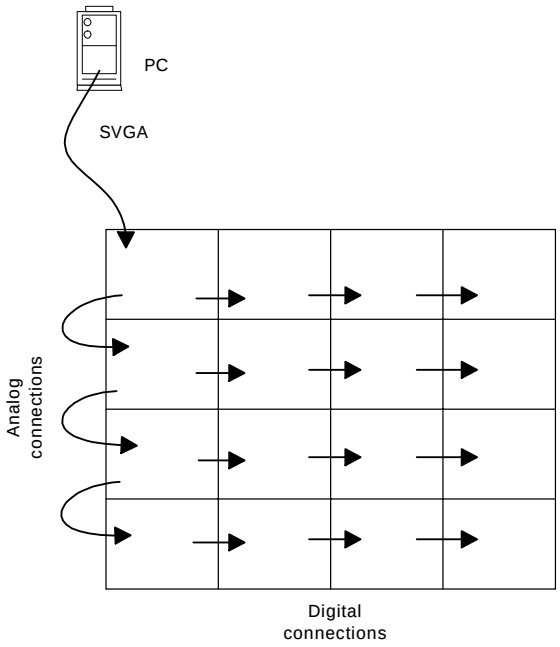
So how do you feed one signal to 16 cubes in a 4 × 4 wall? Or 48 cubes in a 4 × 12 wall? Here are some suggestions.

Analog, then Digital

In this example, a wall of 16 cubes is connected with both analog and digital loop-thrus.

The source is an SVGA picture from a PC. This comes into the Analog 1 connector of the first cube and loops out of the Analog Loop-Thru to the Analog 1 connector of the second cube.

The Digital Out of each cube in the first column is connected to the Digital In of the next cube in the row, and so on across the whole row.



In this system, the farthest cube is only seven cubes away from the source.

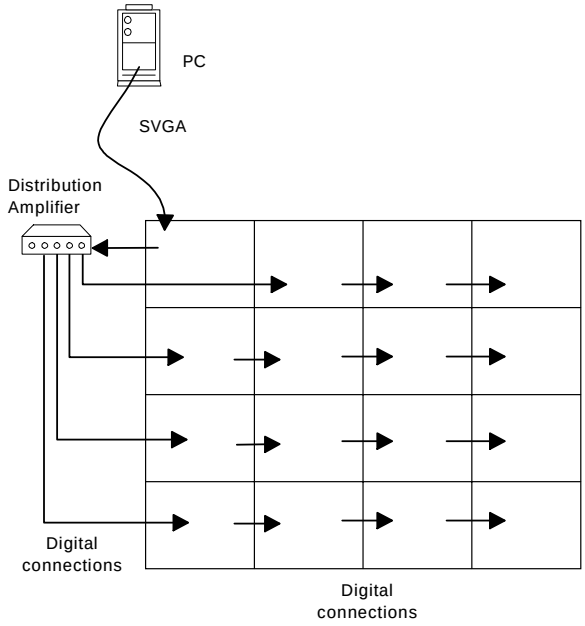
Digital distribution amp

If you want to connect a large wall with digital only, use an external digital distribution amplifier.

In this system, the first cube is fed an SVGA picture from a PC, as before. Then the Digital Out is taken to the external distribution amp (DA).

The DA feeds the rest of the cubes in the first column, and the digital outputs feed the rows. In this

arrangement, the farthest cube is six away from the source (including the DA).



Other ways

Some installations use a very large DA, or several DAs, and feed each cube with a separate line. This is done quite often with analog DAs and works well.

Other possibilities include feeding an analog signal to one cube, taking its digital output to a digital DA, and feeding all the rest of the cubes directly from that digital DA.

Which method to use?

Whatever method you use, try to arrange it so that the signal to the farthest cube goes through no more than 7 or 8 amplifiers. In counting amplifiers, include each DA and each cube the picture loops thru, but not the source itself.

Video loop-thru

Straight video loop-thru of composite or S-Video sources also has limitations. How far loop-thru will continue to look good depends somewhat on the length and quality of the cables used.

In S-Video particularly, there are inexpensive, low quality cables available that won't loop beyond a few displays. The early symptom is loss of chroma (color).

For video loop-thru, it is not necessary to terminate the last cube. The signal is terminated and buffered in each cube.

3.5.4 Connecting RS232 Control Cables

Many installations control the displays with RS232 commands from a computer or processor. This is the best way to turn the whole wall on and off.

RS232 control has one big advantage: you can control all the cubes from a computer at a considerable distance from the wall. You can control

- cubes one at a time;
- several video walls separately;
- all the cubes in all the walls at the same time.

✎ If your installation will *not* use RS232 control, skip this section.

RS232 connections are made with cables like those used for computer networks. These cables have eight (8) conductors and have RJ-45 connectors on each end.

✎ It is important that the cable have 'straight through' connections. To know if your cable is correct, hold the two connectors side by side with the ends pointing in the same direction. Look at the side of the connectors that do not have the locking tab. If the colors of the wires inside the connector are the same left to right for both connectors, this is the correct cable. If the colors are mirror reflections of each other, it is the wrong type.

You need an **adapter** to go from the computer's 9-pin serial output connector to an RJ-45 connector. Adapters of this type are readily available at computer and electronic supply stores. You will only need one adapter; all the rest of the connections will be RJ-45 to RJ-45.

The adapter is not pre-wired. You will make three connections inside the adapter, as described on the facing page and in 'Glossary of Terms' on page 200.

Connecting RS232 cables

1. Connect the adapter to the serial output connector of the controlling computer. (This computer does not have to be the same one as the computer used as a picture source.) The serial output is sometimes called the Comm Port, and sometimes there are two.

✎ If the serial output is a 25-pin connector, use a 25-to-9-pin adapter, then the 9-pin to RJ-45 adapter.

2. Connect a cable from the RJ-45 adapter to the nearest cube's RS232 In connector.
3. Connect this first cube's RS232 Out connector to the next cube's RS232 In connector.
4. Continue in this way until all cubes are connected.

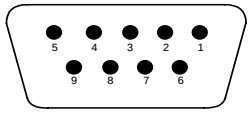
✎ The order in which you connect the cubes is *not* important. You can connect them in any order that is convenient and keeps the cable lengths to a minimum.

Wiring the adapter

To change the RJ45 connectors to 9-pin D-sub connectors, use a standard RJ45-to-9-pin adapter and connect it internally as shown. The wiring shown for this adapter is correct for *straight-thru* cables. Straight-thru cables are wired 1-to-1, 2-to-2, etc.

Yellow wire	pin 3
Black wire	pin 2
Green wire	pin 5

RJ45	9-pin
6	3
5	5
3	2



3.6 Installing the Screen

This is a two-person job. Do this after the whole wall is built and the cables are connected.

Install the screen after the whole wall is built.

⚠ *CAUTION*
Be sure the upper chassis is securely bolted to the lower section before installing the screen. If they are not bolted together, the upper section will tip over with the added weight of the screen.

⚠ *CAUTION*
The screen is heavy, about 48 pounds (21 kg), it is glass and it is expensive. Take care.

1. There are four slots in the back edge of the screen. Orient the screen so the four slots are toward the top. The screen guide arms go through the upper (thin) slots.
2. Check that the four shoulder nuts on the inside of the screen are very loose.
3. With two persons, lift the screen at the sides. Tilt the bottom of the screen away from the display at 30° or more and hang it on the screen guide hooks so the upper studs on the screen go in the notches on the guide arms. It is easier to do this one side at a time, one person holding still, and the other person hanging the screen on the hook.
4. Tighten the nuts. These nuts have shoulders to hold the screen and allow it to rotate. Manipulate the screen to make the shoulders on the nuts go into the round holes in the screen guide arms. Tighten the nuts.

⚠ *CAUTION*
It is critical that the screen hangs on the shoulders of the nuts and not on the threads.

5. Pull the screen all the way out on the guides. Keep it even on both sides as you pull it out.

Attaching the latch arms

1. Inside the display chassis, install the two screen latch arms, one on each side.
   a) The small open end points out toward the screen.
   b) The smooth side should be against the chassis wall.
   c) The arms rest in brackets on the inside walls on the chassis and poke out the lower slots in the chassis.
2. Slide the latch arms forward and into the lower slots on the screen.
3. Slip the latch arms onto the studs in the screen.
4. Tighten the nuts. These nuts also have shoulders. Make sure the shoulders fit into the round holes at the end of the latch arms.

Open the screen all the way

Pull the bottom of the screen out *slowly.* As you do this, the screen will tilt and notches on the ends of the latch arms will catch on the chassis. The screen will then stay in this open position, allowing you to work inside.

✎ Where screens are adjacent to each other, be sure the screens do not catch on each other when you are tilting them. Damage to the screens could result.

Close the screen

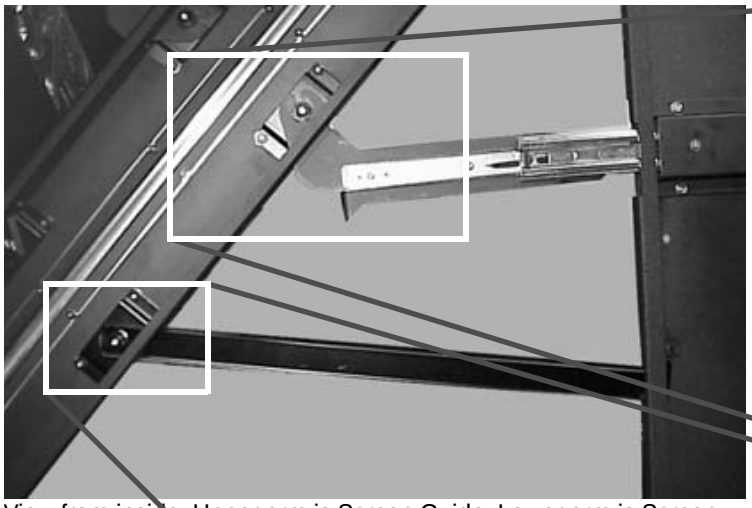
1. With one person on each side, pull out slightly on the bottom of the screen and lift the latch arms at the chassis end. This will disengage the notches on the latch arm.
2. Lower the bottom of the screen until the screen is vertical.
3. Push the screen all the way in.
4. Press the heel of your hand against the corner until the spring-loaded latches click into place. You may have to lift the screen a little to get guide pins on the chassis to fit into the holes in the back of the screen. Don't hit the glass hard. Glass can break.

For tilted walls

For walls that are tilted forward, there is one more required process. Inside the display on the right and left sides of the screen, there is a retaining screw. These screws prevent the screen from rolling forward, should the spring latches accidentally let go.

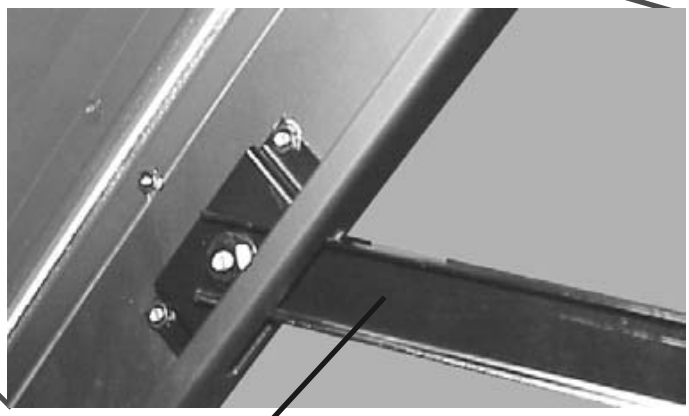
1. Close the screen from the front.
2. Open the left and right rear panels. Tighten the screen retaining screws in the middle of the right and left sides of the chassis.

n



View from inside. Upper arm is Screen Guide. Lower arm is Screen Latch.

Screen guide attached to screen, seen from inside the screen.

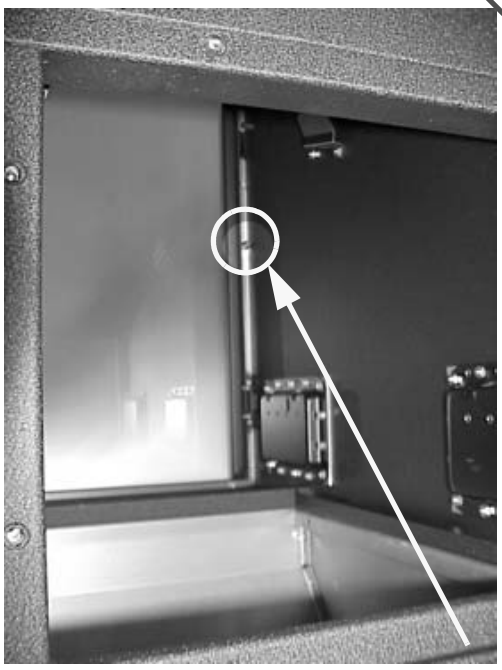


Screen latch arm attached to screen, seen from inside the screen.

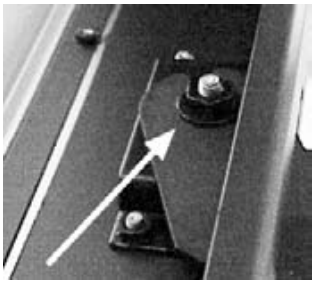
Screen end

Chassis end

Screen Latch



Looking from the rear into the Air Intake Bay. Arrow shows the location of one of the screen retaining screws. Open the Lamp Bay rear panel4 to see the other screw. These must be tightened for tilted walls.



When properly tightened, the shoulder of the nut rests against the screen guide or screen latch arm.

Two views of shoulder nuts.

3.6.1 Opening and Closing the Screen

The screen is held against the chassis with spring-loaded latches. It pulls forward on guides, like a filing cabinet drawer. The bottom of the screen tilts up so you can work beneath it.

The screen slides in and out on guides, like the drawer guides used in good, metal filing cabinets. When you pull the screen forward, it rides on these guides, which extend about a foot (30 cm).

The screen is held against the frame by four spring-loaded latches, one at each corner.

The way you open the screen depends on whether the unit is in a wall or is standing alone.

When the display is standing alone

1. With your fingers behind the screen, pull sharply at each side. You only need to move the screen out about one inch to release the latches. When all four corners are released, you can pull the whole screen forward on the guides.
2. Pull up the bottom of the screen. It will tilt up, and latch in position, allowing you to work beneath. Two arms, one on each side, keep the screen in this tilted position.

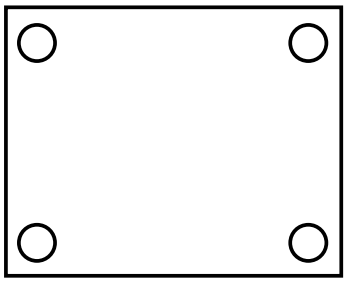
When the display is in a tilted wall

1. Remove the rear panels to the Air Intake Bay and the Lamp Bay.
2. Loosen the captive screen retaining screws in the middle of the right and left sides of the screen.
3. Now follow all the steps “When the display is in a vertical wall” below.

When the display is in a vertical wall

Use the suction cup to pull out each corner.

1. First, be sure the inside surface of the suction cup is clean and free of dirt and grit. Grit may scratch the glass. Dust will prevent it from gripping.
2. Press the cup against the screen in one of the corners as shown here.



3. Pull the suction cup sharply a short distance. You only need to pull the screen out about one inch at this time. You will hear a click as the spring-loaded latch releases.
4. Release the suction cup by lifting one of the two short posts.
5. Do the same for the other corners. When all four corners are released, you can pull the screen forward on its guides. Pull it straight out, don’t twist the screen.
6. Pull up the bottom of the screen. It will tilt up and latch in position, allowing you to work beneath. Latch arms, one on each side, keep the screen in this tilted position.

Closing the screen

1. With one person on each side, pull out slightly on the bottom of the screen and lift the latch arms at the chassis end. This will disengage the notches on the latch arm.
2. Lower the bottom of the screen until the screen is vertical.
3. Push the screen all the way in.
4. Press the heel of your hand against the corner until the spring-loaded latches click into place. You may have to lift the screen a little to get guide pins on the chassis to fit into the holes in the back of the screen. Don’t hit the glass hard. Glass can break.

CAUTION

Don’t break the glass screen. If the screen does not latch in easily, it may be that the holes in one corner of the screen are hanging up on the shoulder of the corner guide pins on the screen alignment bracket. Check the wall to be sure all the chassis are in a straight line. If you force the screen, the glass may break.

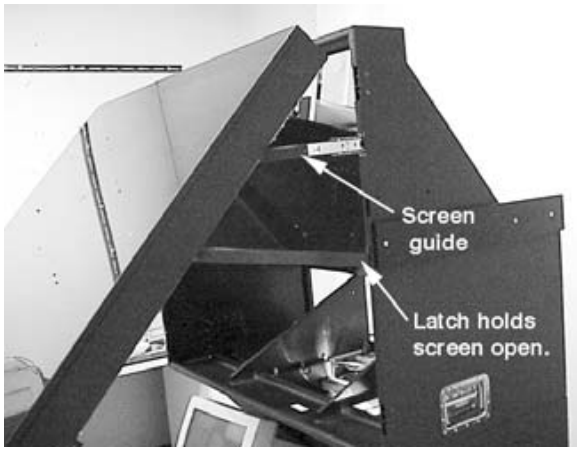
5. If this is a tilted wall, be sure to secure the two screws from the rear on each side of the screen.

Step 2. Press the suction cup against the screen.

Step 3. Pull the screen out about one inch.

Suction cup is used to open the screen.

Step 4. Release the suction cup by pulling one of the posts.



Step 6. Screen held open with latches.

If the wall is tilted, loosen the Screen Capture Screws, seen here from the rear through the Air Intake Bay. There is another screw on the other side.

3.6.2 Removing a Screen Completely

This is a two-person job. Don't try it alone. The screen weighs almost 50 lbs. and can be awkward to handle. If the wall is tilted forward, you have to do some of this from the rear. Normally, you only remove the screen when moving the entire display.

Removing the screen

1. If the display is tilted, open the rear panels on the right and left side. Loosen the Screen Capture Screws, one at each side of the screen near the middle. These are captive screws.
2. From the front, open the screen and extend it fully. (If you are not sure how to do this, see 'Opening and Closing the Screen' on page 66.)
3. Tilt the screen to its latched position by pulling out the bottom.
4. Loosen the two shoulder nuts on the screen latch arms (the lower arms).
5. Remove the screen latch arms from the stud and remove them from the chassis.

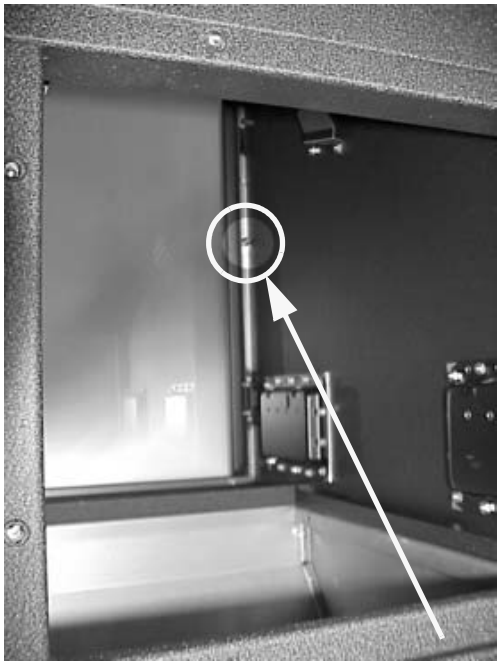
CAUTION

Do no transport the display with the screen latch arms (the lower arms) in the chassis. They may bounce around and cause damage. Pack them separately. Or wrap them securely in bubble wrap and store them in the Air Intake Bay.

CAUTION

The next steps must be done with at least two persons.

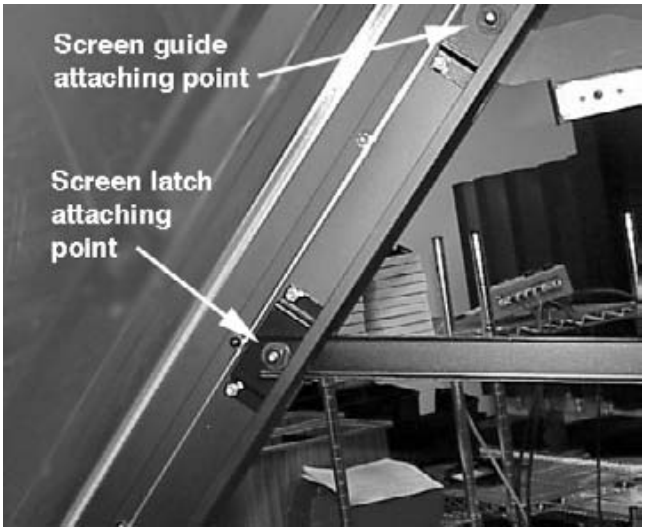
6. With one person at each side of the screen, loosen the two shoulder nuts on the screen guides.
7. Rotate the bottom of the screen up slightly, and lift the screen off the screen guides and set it aside.
8. The four shoulder nuts can be left in place on the screen.



Screen Capture Screw as seen from the rear through the Air Intake Bay. There is another screw on the other side.

Screen guide shoulder nut.

Screen latch arm shoulder nut



3.7 Taking a Wall Apart

Remove and store the screens first. Then take the units down, one piece at a time. Do not attempt to move (or ship) a whole, assembled display.

Disconnect cables

1. Turn off the power to each display.
2. Disconnect all power, video, and RS232 cables.

Remove the screens

1. Remove *all* the screens. See the previous section, 'Removing a Screen Completely' on page 62.

> ⚠ *CAUTION*
> Do not attempt to take the wall apart by whole display units. The assembled unit is too heavy and too awkward to handle in this way. Take the displays down in sections.

2. Tape *all* the screen guides back to the chassis so they won't roll forward and get in your way when you move the upper sections.

Remove the upper sections

1. Disconnect any tie-backs that hold the **top row only** to building walls or other structures.
2. Remove all the screen brackets from the front of the display **from the top row only**. Remove all the brackets that touch the top row of displays.
3. Remove the side-to-side wingnuts and bolts from the top row.
4. Loosen the 10 captive screws that hold the upper section to the lower section for one of the end displays on the top row.
5. Using at least two persons, lift this upper section off and set it aside.
6. Continue steps 4. and 5. across the top row until all the upper sections are removed.

Remove the lower sections

1. Remove the side-to-side wingnuts and bolts that hold these lower sections together.
2. Using at least two persons, lift the lower section off from one of the ends and set it aside. Continue along the row until all lower sections are removed.

Continue

There is now a new top row. Repeat all the steps above with each row. The lower section of the bottom row may be secured to the floor or a platform.

4 Adjusting the Picture

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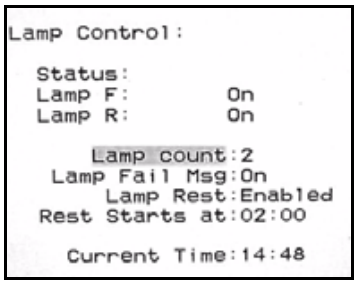
4.1 What To Do First

After the wall is built, several items should be checked before you connect source pictures.

Lamp Control

Lamp Control is always on. If you are using 1 lamp, the system will automatically turn on the other lamp (if there is one available) in the event the first lamp fails

- If a lamp does not turn on the first time, the system will try 15 more times.
- If a lamp fails, a message will appear on the screen in the source absent space. This message can be controlled by the user in the lamp control menu shown below.



LCD Alignment

The next section gives instructions for aligning the LCD to the screen, a *very important step*. In that section you will hide some pixels behind the **mullions**. The mullion is the metal strip around the outside edge which hold the screen in place.

Pixels must be hidden behind the mullions so that pictures spreading over a wall of Lions will fit together correctly, whether you use Clarity's Big Picture™ or an external video processor.

How many pixels to hide

Lion screens come in two mullion widths: 1.75 mm, (about 0.07") and 3.5 mm, (about 0.14"). The number of hidden pixels depends on the resolution of the LCD and the width of the mullion as shown in the table opposite.

The following section tells you how to move the LCD to hide pixels.

Number of Pixels to Hide

Mullion width	Pixels
0.07" (1/16”, 1.75 mm)	2½
0.14" (1/8”, 3.5 mm)	4½

4.2 An Important Step: Aligning the LCD

Aligning the LCD image to the screen must be done first. If you don't check this first, later adjustments may be a waste of time.

Rule No. 1: If it doesn't need adjusting, don't adjust it.
Rule No. 2: Always follow Rule No. 1.

The adjustments in this section align the LCD image to the screen, giving the image the right position and size. Use the **Geometry Pattern**, described below, to do general alignment. Use the **Alignment Dashes** to hide an exact number of pixels.

Does the LCD have to be moved?

1. Turn on the AC power.
2. After one minute, aim the remote control at the screen and press LAMP ON. When the lamps are lit, press MENU.
3. Press the down arrow key to highlight LCD Alignment.
4. Press ENTER.
5. Highlight Alignment Dashes, press ENTER and wait. In a few moments you will see white dashes appear at the edges of the screen.
6. There are six dashes in each group, representing the outside six pixel rows and columns of the LCD. You won't see them all because some will be hidden behind the mullion. (If you have *not* read 'LCD Alignment' and 'How many pixels to hide' in the previous section, do so *now*.
7. *If* (and only if) the LCD needs adjusting:
   - Highlight Left Edge, Right Edge or Horizontal in the menu.
   - Press + or – momentarily to move that part of the LCD pattern one small amount.
   - Press and *hold* + or – to move that part continuously.

✎ You may see only five dashes on the left side of the screen, no matter how far you move the LCD horizontally. If this happens, highlight Alignment Dashes again and press the + or – a few times to make all six dashes appear. Then move the highlight up to the three motor controls and continue.

8. Adjust the LCD to hide the number of pixels shown in the table opposite. Try to come within 1 pixel of the suggested number of hidden pixels in the table.

✎ You may notice a very slight curve of the sides, where the center of a side hides or shows a half pixel more than at the corners. This is not unusual, there is no cause for alarm, and there is no adjustment for it.

9. When the LCD is centered, hiding the same number of pixels all around, but there are too many or too few pixels hidden, rotate the large lens just in front of the electronics module. Screwing the lens

in (clockwise) makes the pattern larger.

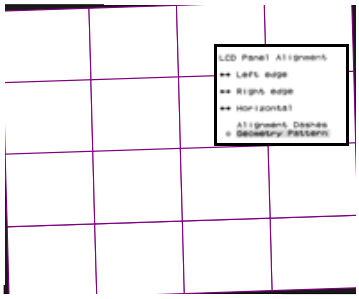
✎ Check the LCD position on each display. Check it each time the displays are moved into a new position. Shipping sometimes 'adjusts' the LCD position. It's best to check again every time wall is built.

10. To exit the LCD Alignment menu, press PREV and the pattern will disappear.

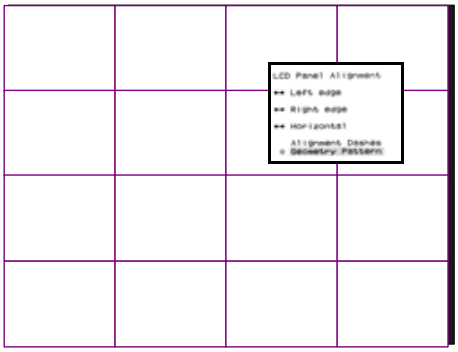
Geometry Pattern

There is also a Geometry Pattern, which is a 4 × 4 grid. Highlight this and press enter to see it. It takes longer to draw this pattern than the dashes. The interior lines are 1 pixel wide and the borders are 3 pixels wide.

If the left side border is only two pixels wide, no matter how far you move the LCD horizontally, highlight Geometry Pattern and press the + or – buttons to fix it.

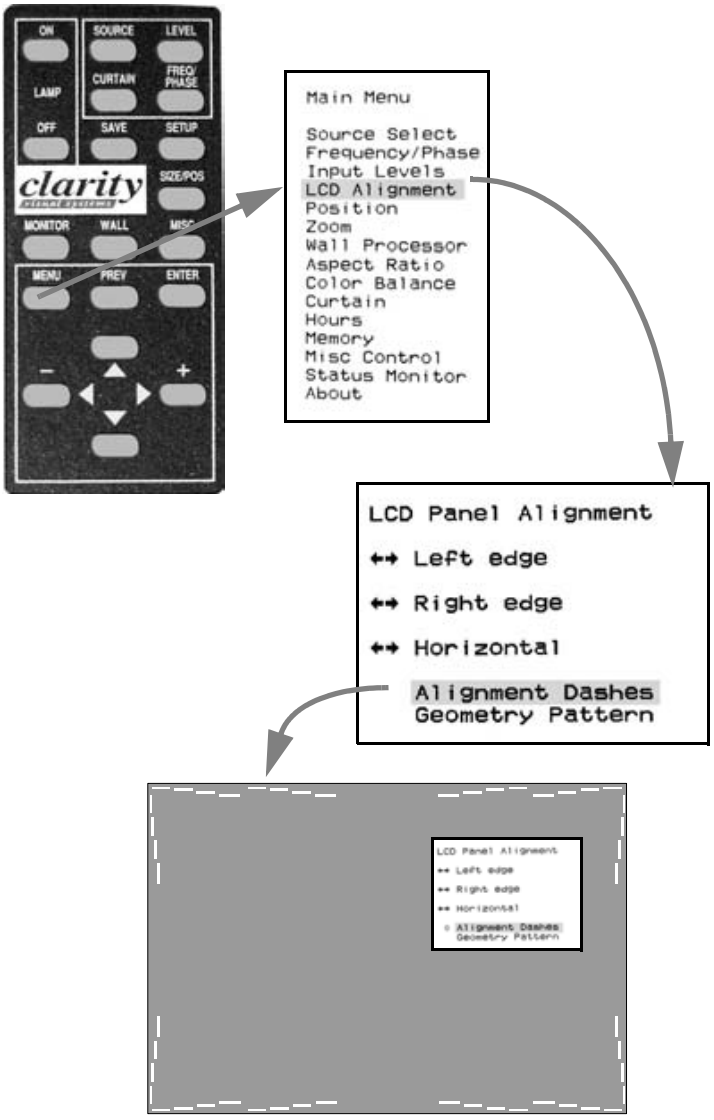


If the picture is rotated, use the Left or Right Edge controls.omu



If the picture is moved left or right, use the Horizontal control. This is the Geometry Pattern.

If the picture is too small, rotate the lens clockwise.



Number of Pixels to Hide

Mullion width	Lion UXP
0.07" (1/16", 1.75 mm)	2½
0.14" (1/8", 3.5 mm)	4½

4.2.1 How LCD Alignment works

Three motors move the LCD.

The two edge motors move the LCD up and down and the horizontal motor moves it sideways. Each time you push a right or left key once, the motor moves a small amount and stops. If you hold the button, the motor runs continuously.

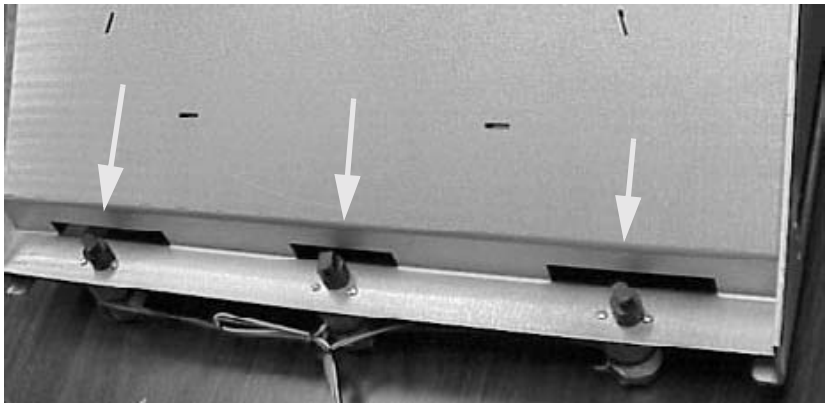
The motors move the LCD with eccentric cams, which means they have a cyclic effect. If you hold the button for one motor long enough, the image will come back to where it started. There is some horizontal movement when you move one side vertically, and there may be a little vertical movement when you move horizontally.

When you go too far in one direction and want to go back, there is a little slack. It takes several 'kicks' in the opposite direction to make the LCD move.

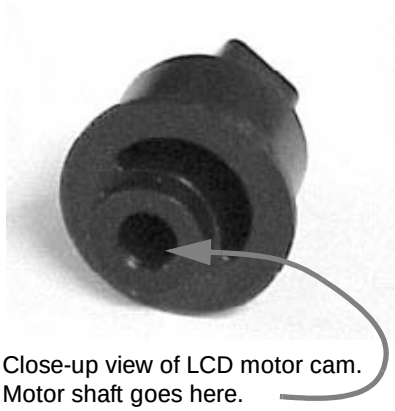
If you see black all around the picture, check to see that the screen brackets are in place and that the screen is completely closed against them. There must be a screen bracket in each corner, even if this display is standing alone.

Use the objective lens to change image size. Open the screen (or reach into the Electronics Bay through the rear) and rotate the large lens. Rotating the lens adjusts image size, not focus. (There is no control for focus.) Adjust the image size so that you lose at least two pixel on all four edges.

✎ If you use RS232 commands to adjust the LCD, the remote control will not work while the pattern is on.



Three motors with cams showing at the bottom of the optical engine.



Close-up view of LCD motor cam.
Motor shaft goes here.

4.2.2 Keystoned Pictures

A keystoned picture is wider at the top or bottom, or taller on one side than the other. It is not common in Lions, but you should know how to correct it.

Keystone pictures have this shape ▭ or this shape ▱. They are wider on one edge than on the opposite edge. It is not a common problem, but if you think one of your Lions has this problem, do this:

1. Turn on the internal Geometry Pattern from the Test Pattern menu.
   a) Press MISC. three times to open the Test Pattern menu.
   b) Choose Geometry Pattern at the bottom of the list and press ENTER.
2. Compare the width of the top of the pattern to the width at the bottom. If these two are the same within one or two pixels, leave it alone.
3. Compare the height on the left side with the height on the right. If these two are the same within one or two pixels, leave it alone.

⚠ *CAUTION*

Do not try these adjustments unless you are sure they need to be done. This is not something you want to adjust 'just to see what happens.' These three nylock nuts were sealed with thread-locking fluid to prevent them from turning accidentally, so they may be very hard to start.

✎ Do not confuse image rotation with keystone. If you think the pattern is rotated, choose Left edge or Right edge and press + or – to cause one of the sides to go up or down.

If you have keystoning

To adjust for a keystoned picture, the unit must be standing alone, not in a wall. The adjustment nuts are on the back of the upper section, behind the large mirror. (If the problem is in the top row of a wall, you could adjust it there.)

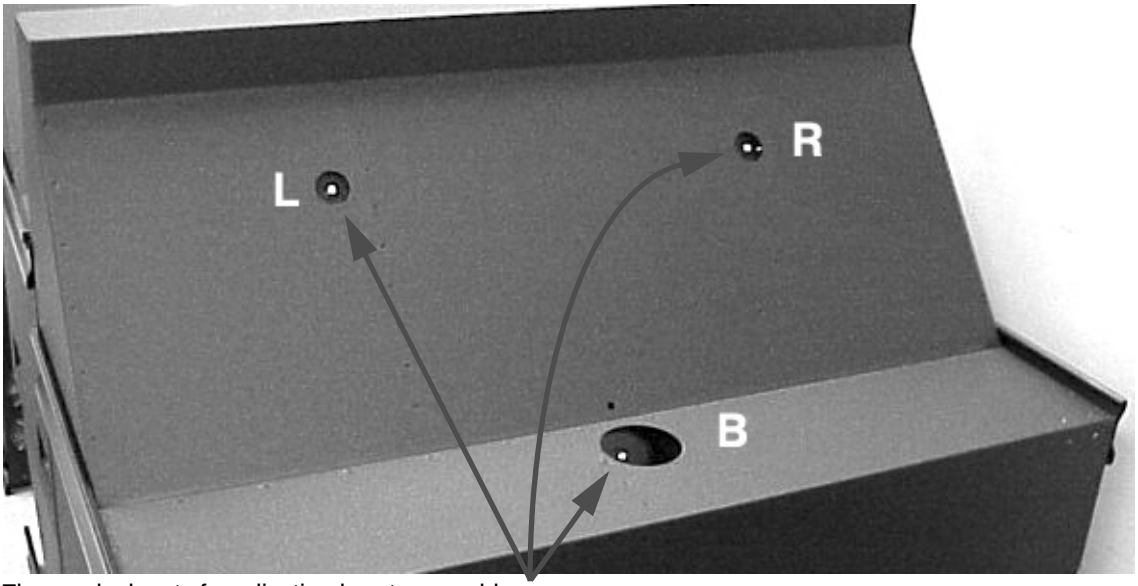
Behind the large mirror, as seen from the rear of the display, you will see three nylock nuts, two toward the top and one at the middle of the bottom.

- In the diagram opposite, the L and R nuts are labeled for the Left and Right sides as you see them from the rear.
- In the table of the effect of these adjustments, 'left' and 'right' mean the picture as viewed from the front.

When adjusting the top two nuts together, turn them the same amount.

To adjust for one side too tall or two short, be very careful. You should turn the L or R nut, then turn the B nut the same direction, but only half as much. This is a very tricky adjustment.

To understand how these adjustments work, keep in mind that the image is expanding as it leaves the last lens. The farther it travels, the larger the image becomes. When you pull the mirror away from the screen, the image has to travel a bit farther, so it is larger on the screen. Tightening a nuts pulls the mirror away from the screen.



Three nylock nuts for adjusting keystone problems.

Effect of Adjusting Large Mirror Nuts

Location	Tighten	Loosen
L & R together	Top wider Image moves up	Top narrower. Image moves down
B	Bottom wider. Image moves down.	Bottom narrower. Image moves up.
L & ½B	Right side taller. Image moves right.	Right side shorter. Image moves left.
R & ½B	Left side taller. Image moves left.	Left side shorter. Image moves right.

4.3 Setup Part 1: Sources

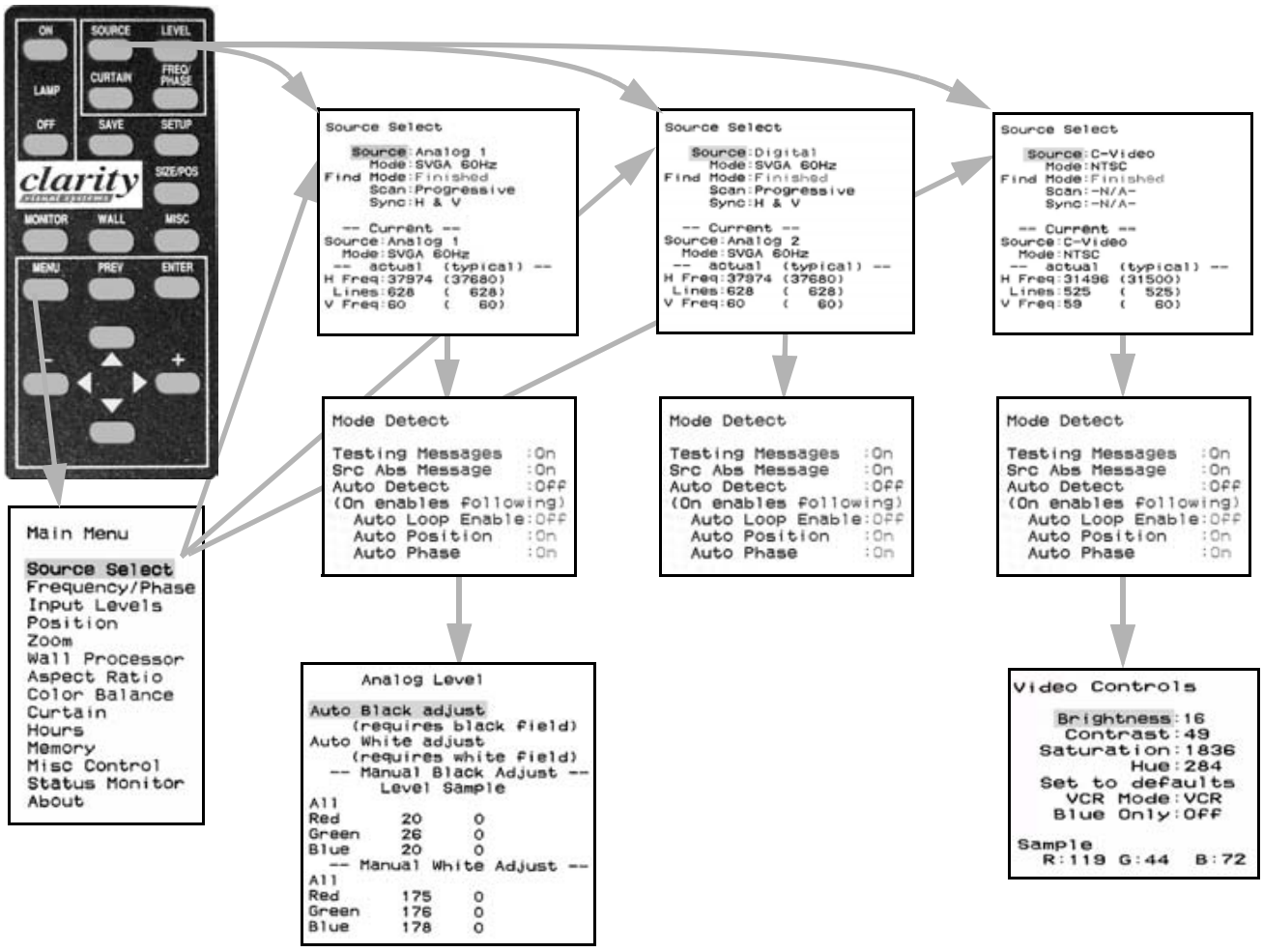
The first part of setup is different for each type of input. What you do for computer images is different from what you do for video images. Menu chains (paths through the menus) change to reflect the selected source.

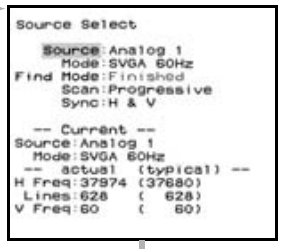
The setup procedure is divided into three main parts:

- **Part 1**, this part, contains all the steps to do for *each* source. If you have pictures coming into Analog 1 and Analog 2, you must do the setup separately for both of these. If you do not have anything connected to S-Video In, you can skip that section. What you do in Part 1 depends on which source you are using at the moment.
- **Part 2** has the things you have do to each display and to the whole wall, no matter what picture source is used and no matter how many sources you have connected. Part 2 is the same for all sources.
- **Part 3** is saving your work and recalling what you have saved.

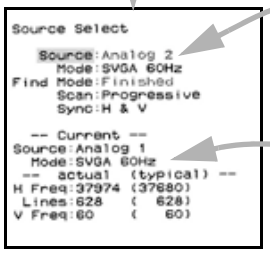
Several of the fast keys on the remote control go through a menu chain. When you press the button once, you get the first menu. When you press it again you get the next menu, and so on.

The menu chains for several buttons are different depending on the source type. They go through one sequence if the source is Analog and another sequence if the source is Digital or Video. The three SOURCE button chains are illustrated on the facing page. Which path the Lion takes depends on the current source type.





After pressing right arrow…



… the listed source is red, which means it does not match the current source.

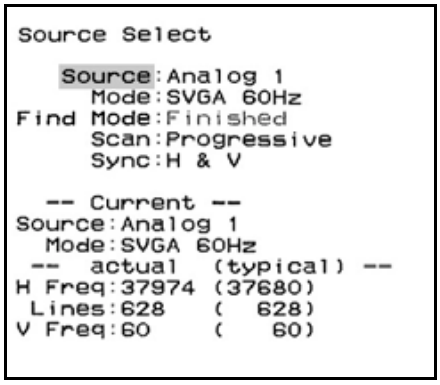
Press ENTER to make Analog 2 the current source.

4.3.1 How to Select the Source

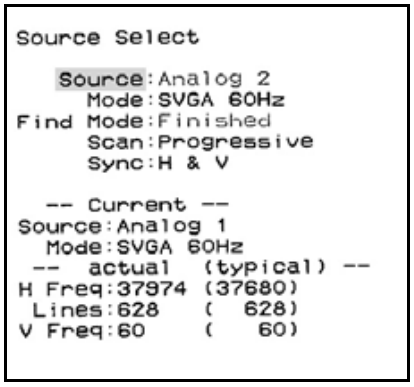
To choose a picture source in the Source Select menu, select the source with the left-right arrow keys, then press ENTER.

In the Source Select menu, you must press ENTER after your selection. **Source** is the connector where the Lion will get the picture. **Mode** is the type of picture.

1. Press SOURCE on the remote to open the Source Select menu. If the word 'Source' is not highlighted, use the up-down arrow keys to highlight it.



2. Use the right-left keys to select a source connector. The *current* source, the one that is active *now*, is listed at the bottom of this menu. The source at the top is red when it does not match the current source.



3. Press ENTER to activate the source you have chosen.

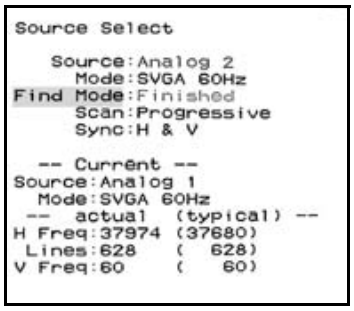
✎ If you exit this menu without pressing ENTER, no change occurs.

4. Choose the Mode:
   - If the source you selected is **Analog 1 or 2** or **Digital**, move the highlight to Find Mode and press ENTER. This forces the system to detect the mode of the source picture. While it is detecting the mode, you will see 'Seeking' then either 'Good' or 'Bad' depending on the outcome of the process.
   - If the source is C-Video or S-Video, move the highlight to Mode. Use the right-left arrow keys to select NTSC, PAL or SECAM. Press ENTER.

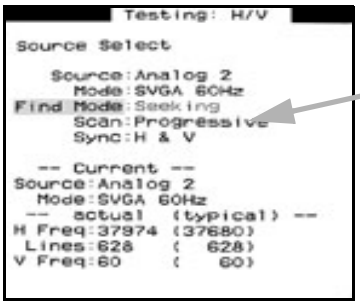
Mode Detect

Other actions may occur in the Source Select menu, depending on the settings in Mode Detect. Press SOURCE again on the remote to open the Mode Detect menu. Mode Detect is explained in the next section.

✎ If you select mode HDTV 1080i, see 'Special Notes for 1080i & 1024i Modes' on page 90.



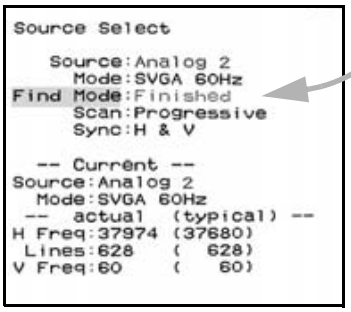
To set the mode of the source, highlight Find Auto and press ENTER

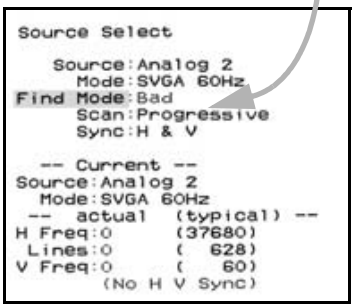


Find Mode starts Seeking the mode …

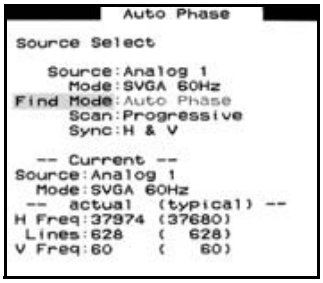
and is successful …

or not successful.



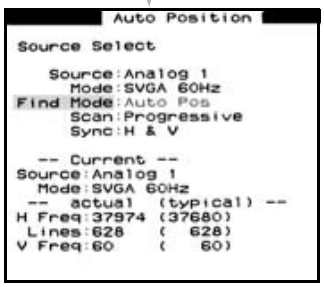


If Find Mode was Good *and* Auto Phase is On, then…



If Find Mode was Good *and* Auto Position is On, then…

(This is very fast; you may not see it.)



4.3.2 Mode Detect in Action

In the Mode Detect menu, you decide whether several actions are automatic or manual, and whether detection messages will appear on the screen.

The Lion must know what type of source picture it is displaying: SXGA, UXGA, and others for computer sources; NTSC, PAL, SECAM for video sources. This is the **mode**, the type of source picture the Lion will use. If the mode does not match the actual source picture, the image may be very distorted or may not display at all.

You can **choose the mode manually** by highlighting **Mode** in the Source Select menu and pressing +/– until the right mode appears. This is not recommended, because the automatic system is

Or you can let the Lion look at the incoming picture and **automatically** choose the mode. If you use the automatic system, you have these two choices:

- You can start the automatic process by highlight **Find Mode** and press ENTER each time the Lion needs to find the mode. This is **Auto Detect off**.
- You can let the Lion watch the incoming picture, and if it changes modes, let the Lion find the new mode. This is **Auto Detect on**.

You turn Auto Detect on and off in the **Mode Detect** menu.

To open the Mode Detect menu, press SOURCE twice on the remote hand unit or select the Misc. sub menu from the main menu.

When Auto Detect is on, the Lion will start the Find Mode (in the source menu) process whenever the source picture is not the current mode.

- If any of the Autos listed below Auto Detect are also on, they are activated in the order - Freq/Phase, Position.
- During the whole Mode Detect process, Curtain will be on, except when detecting video modes, and no picture will be displayed.
- Mode Detect will select the frequency closest to that of the incoming signal source whether or not it will produce an acceptable picture. The source menu shows the expected frequency and the measured frequency. If they don't match within 10%, the measured frequency is shown in red.

See also 'Auto Loop Enable' below.

When Auto Detect is off, you can manually start the Find Mode. Select Find Mode and press ENTER.

When Auto Detect is off, the two items below it in the Mode Detect menu are grayed out.

- If Auto Detect is *not* able to find the mode, the menu shows Bad and the process stops.
- If Auto Detect does find the mode, then any of the other Autos that are On in Mode Detect will happen.

✎ During Mode Detect and most of the other automatic processes, the Curtain is turned on, removing the picture. The default color for the Curtain is black, but you can change it. (See 'Curtain and Its Colors' on page 130.)

Video Modes

Auto detect is done differently for video than for other sources. The timing is much shorter and the auto detect curtain will not appear. If the input is switched from NTSC to PAL or vice versa, the mode will change automatically.

Auto Loop Enable

If Auto Loop Enable is **on**, Auto Detect will continue to cycle, trying the three modes again and again until sync is found.

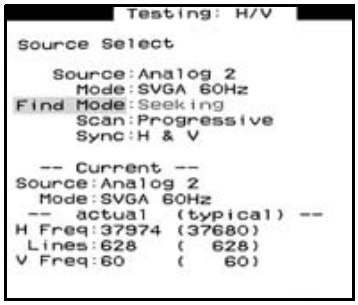
If Auto Loop Enable is **off**, Auto Detect tries to find the mode only once, whether this action is started automatically or manually.

Messages

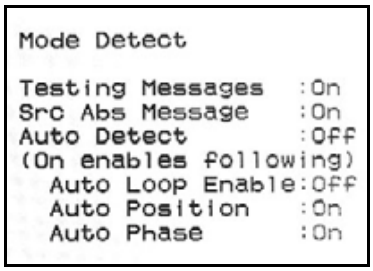
If **Testing Messages** is on, during the various parts of Auto Detect a message will appears letting you know what is happening. This is true whether the Source Select menu is visible and the process is started manually, or it is not visible and the process happens automatically.

If **Src Abs Message** is on, a sign saying, "Source Absent" appears on the screen for 30 seconds. This occurs whenever there is no source on the selected connector.

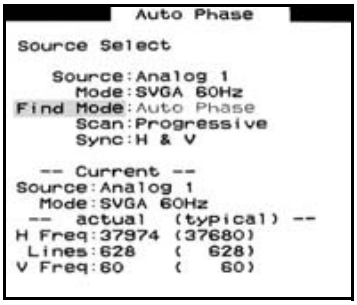
Lack of a valid source will also turn on the source absent Curtain. The default color is black, but you can change this. (See



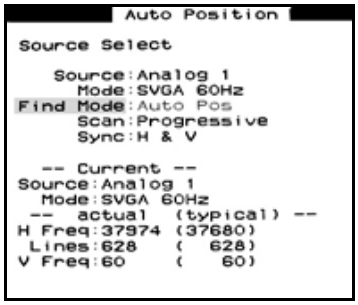
Whether Find Mode is started automatically or manually, it starts seeking the mode (Analog and Digital sources only).



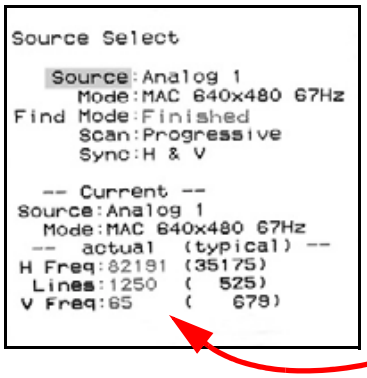
Mode Detect menu showing its default (factory) settings.
When Auto Detect is Off, the three lower Autos are grayed out, but you can still change them.



If Phase is on, the Lion starts to find the correct frequency and phase.



If Auto Position is on, the Lion puts the upper left corner of the picture in the upper left corner of the screen. This is very fast, and you may not see Auto Pos in the menu.



The source menu shows the expected frequency and the measured frequency. If they don't match within 10%, the measured frequency is shown in red.

Red when parameters don't match current sourc.

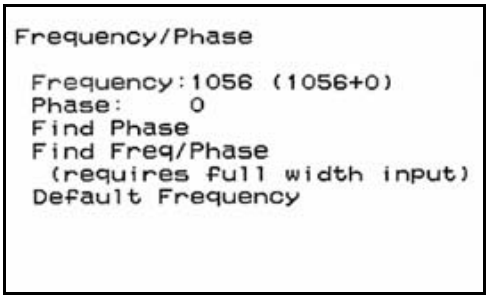
4.3.3 Frequency and Phase

fThese adjustments match the display's dot clock to the computer picture's bit frequency. Frequency and Phase adjustments are automatic or manual. They do not apply to digital or video sources.

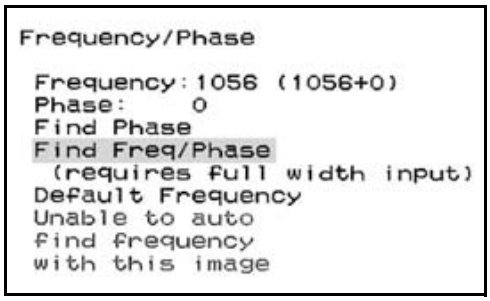
Frequency and Phase adjustments must be made using the computer that has, or will have, program content. It doesn't work to make these adjustments using a laptop, then switch to the 'real' computer later for program material.

Automatic adjustment

1. Press FREQ/PHASE on the remote. This opens the Frequency/Phase menu.



2. To adjust automatically, select Find Freq/Phase and press ENTER. The Lion will make both adjustments quickly with most pictures. If the Lion cannot make the adjustment, you are notified with a message. Either change the picture, or make the



adjustments manually, as described below.

✎ If the electronics cannot find frequency, you can adjust the frequency manually and use Find Phase to adjust the phase automatically.

For a precise adjustment, you will need a checkerboard pattern. A checkerboard pattern looks like an all-gray picture, but it isn't. In a true checkerboard, alternate pixels are black and white. It is the hardest picture for the display to handle, so it makes a good test.

You can download several bit maps in Lion's resolutions from www.ClarityVisual.com.

Manual adjustment, Frequency first

1. Show a checkerboard pattern from the computer used for program material at the resolution of the program material.
2. On the remote, press FREQ/PHASE to open the Frequency menu. Select Frequency.
3. Using the left and right buttons (marked – +), adjust the frequency back and forth to remove the vertical bands. When the frequency is correct, you should see no vertical bands in the picture.

The number shown in the Frequency menu is the number of horizontal pixels that are displayed. This number will NOT be the same as the horizontal resolution, because many pixels are used in horizontal blanking and are not visible.

Frequency affects the width of the displayed picture.

Manual adjustment, Phase second

1. Still showing the checkerboard pattern, press the down arrow key to highlight Phase.
2. Adjust phase with the – and + buttons. Try to eliminate all horizontal streaking and noise in the picture. If you can't get it all out, don't worry. Just remove as much as you can. Usually there is quite a wide area without noticeable streaking. Adjust Phase to the middle of this area.
3. When finished, press PREV to clear the menus from the screen.

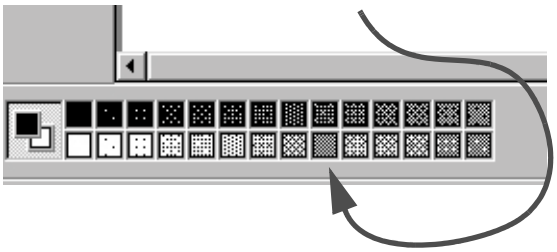
The Phase number is not related to a physical property of the source. The range is 0–31 and wraps around at the end. (Each step changes the phase 11.25 degrees.)

Sources for checkerboard pattern

Make one with Windows Paint program.

1. Choose Image > Attributes > Black and White.
2. Set the Width and Height in pixels.

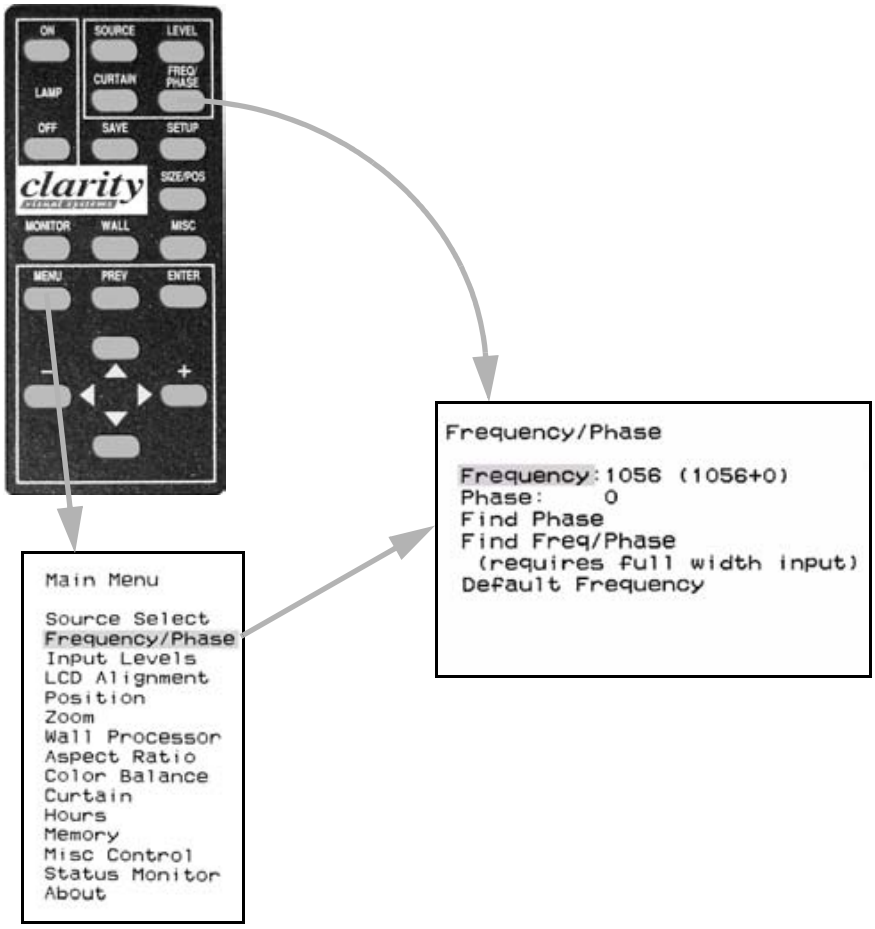
3. At the bottom of the window, click on the checkerboard pattern.



4. Choose the paint bucket icon and click in the picture area. It will fill with a checkerboard pattern. Save this as a bit map (.BMP) file.

Or use the Windows shutdown screen.

5. Have a plain, flat desktop image. Light gray or white is best.



6. Click Start, then choose Shutdown, but don't actually shut down the computer. The image is now a checkerboard.

Reading the Frequency menu

The Frequency number is the number of pixels currently being used in a single line. In the screen below, this is 1056. This number will always be lsarger than the horizontal resolution, because there are black, unused pixels at the end of each line.

The number in parentheses (1056+0) shows the default number of line pixels for the current mode, plus or minus some amount. That is, if you set the Frequency below to 1058, the menu will show

```
1058 (1056+2)
```

When you adjust frequency, either manually with a checkerboard pattern or automatically with Find Freq/Phase, the correct value will *almost* always show a plus-zero.

4.3.4 Analog Level Adjustments

The Analog Level adjustments tell the display what the computer uses for black and white. The adjustments can be automatic, or you can do them manually. Do NOT use these adjustments to adjust color. (This section does not apply to composite or S-Video pictures.)

The display has to know what the computer means by black and white. All computer sources have a slightly different definition of black and white, and the adjustments described here tell the display what *this* computer means. There are two ways to do this.

- Use **Auto Black Adjust** and **Auto White Adjust** to find the levels based on an all-white or an all-black picture.
- Manually adjust the levels. For computer pictures, Auto Black and Auto White Adjust are easier and faster. For RGB pictures, you must adjust manually.

✎ For these adjustments, you *must* use a picture that comes from the actual computer used for the program material. It does not work to set these levels with a laptop computer and then connect a different computer as the source of the program material.

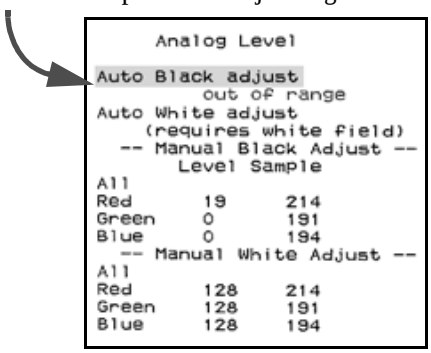
Auto Black Adjust

1. Show an all-black picture from the computer that will be used for program material. You can make one in Windows Paint.

✎ The sample point for Black Adjust and White Adjust is near the center of the screen.

2. Press LEVEL to open the Analog Level menu.
3. Select (highlight) Auto Black Adjust and press ENTER.

The system will quickly adjust the computer's black level. The process takes about one second. If the picture is not close enough to black, a message appears. This prevents adjusting the black level when the picture is white, but it does not prevent other mistakes.



Auto White Adjust

You *must* do Black Adjust first.

1. Show an all-white picture from the computer that will be used for program material. You can make one in Windows Paint.
2. Press LEVEL to open the Analog Level menu.
3. Select White Adjust and press ENTER.

This process takes about three seconds. The system will quickly adjust the computer's white level, and a 'Working…' message appears. If the sample point is obviously not white, an 'out of range' message appears.

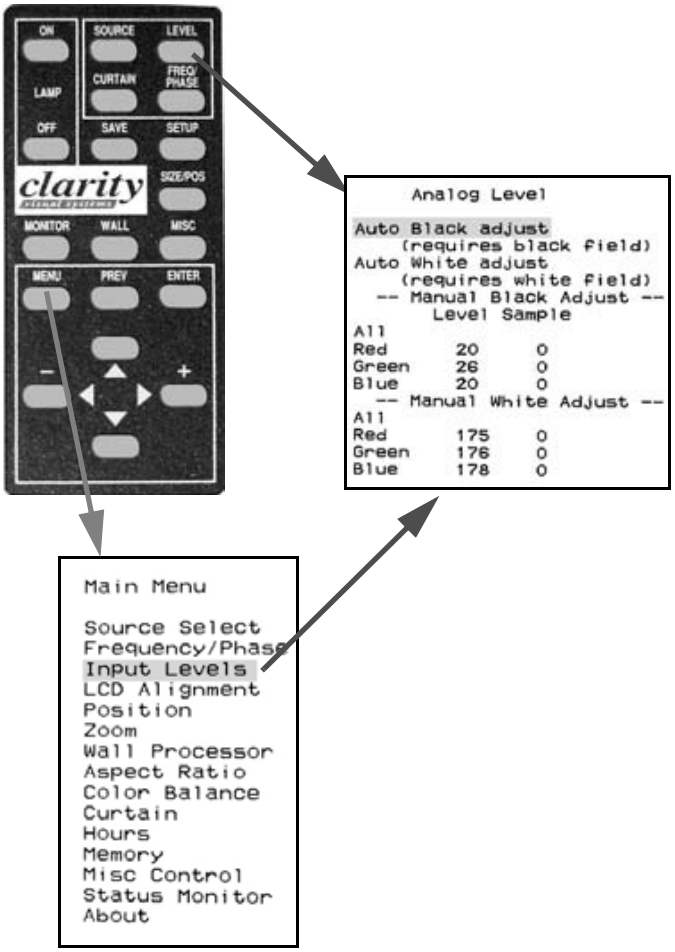
✎ You can download Diag from Clarity Visual's website: www.ClarityVisual.com. It has perfect black and white pictures. Or you can make them with Windows Paint. Or make a solid color desktop.

Manually adjusting levels

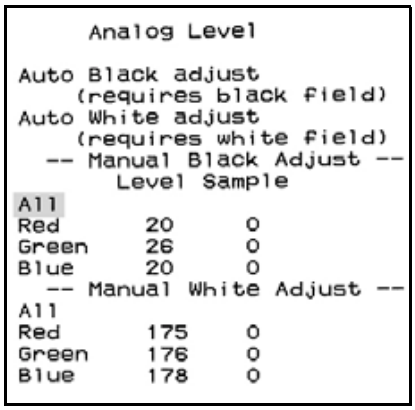
You *must* use this method for RGB or RGBS picture sources, but you can use it for any Analog 1 or 2 source.

1. Display an all-black picture from the RGB source.
2. Highlight each of the three numbers under Black and use the left-right arrow keys to reduce the **Sample** numbers until they reach zero. Go up and down until you are sure the number just touches the zero point and doesn't go beyond it.
3. Black *must* be done first. Display an all-white picture from the RGB source.
4. Highlight each of the three numbers under White and use the left-right arrow keys to increase or decrease the **Sample** numbers until they reach 255. Go up and down until you are sure the number just touches the 255 point and doesn't go beyond it.

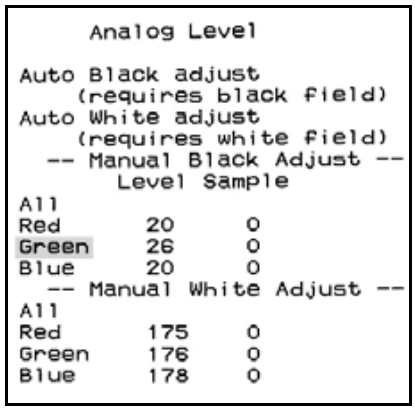
✎ The numbers under Level are not important to you during these adjustments.



Adjusting the black and white levels using the auto adjust.



With the highlight on All as shown here, the + and – arrow keys change all three Black Levels together.



With the highlight on Green as shown here, the + and – arrow keys change only the Green Level of Black Adjust.

Manually adjusting black and white levels.

4.3.5 Adjustments for Video Sources

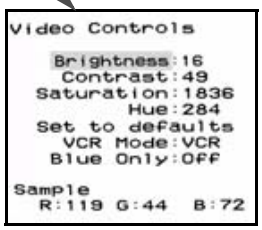
These video sources can be composite or S-Video. The composite (or C-Video) input and the S-Video input have their own loop-thrus.

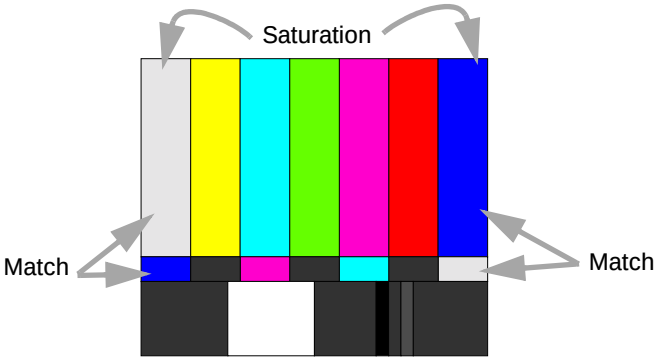
Adjusting the picture

1. Select a video source in the Source Select menu. Then press LEVEL. This opens the Video Controls menu. (If the selected source is not C-Video or S-Video, the LEVEL button will not open the Video Controls menu.)
2. Display an all-black picture *from the video source*. This should come from the actual source that will be used for program material, not from a test signal generator. (For DVD players, frame 50882 on Reference Recordings, 'A Video Standard' test disk has this picture.)
3. Select **Brightness** and adjust it with the +/– keys. Make the R, G, and B values as close to 001 as possible and keep the Brightness number as high as possible.
   a) If the initial Sample values are greater than 001, reduce the Brightness until the first Sample value reaches 001.
   b) If the initial Sample values are 001, increase the Brightness until all Sample values are 002 or greater. Stop increasing Brightness when the last Sample value goes from 001 to 002.
   c) If Brightness is decreased while the Sample values are at 001, the color range for the displayed image will decrease.
4. Display an all-white image *from the video source*. Frame 50823 on Reference Recordings, 'A Video Standard' test disk has this picture.
5. Set the Sample values for R, G, and B as close to 254 as possible while keeping the Contrast number as low as possible.
   a) If the initial Sample values are less than 254, increase the Contrast until the first Sample value reaches 254.
   b) If the initial Sample values are 254, decrease the **Contrast** until all Sample values are 253 or less. Stop adjusting when the last Sample value goes from 254 to 253.
   c) If the Contrast is increased while the Sample values are at 254, the color range for the image will decrease.
6. Display a color bar pattern *from the video source*. Frame 17177 is SMPTE Color Bars. Or use any 75% saturation color bar signal.
7. Select **Blue Only** on the Video Controls menu and press ENTER. This will display only shades of blue.
8. Adjust **Saturation** up or down until the two outside blue bars (which were white and blue) are the same.
9. Adjust **Hue** up or down until the two inside blue bars (which were cyan and magenta) are the same.
10. Set **VCR Mode** On, if the source is a video player without time-base correction (most home VCRs are this type).
11. Exit the menus with the PREV button.

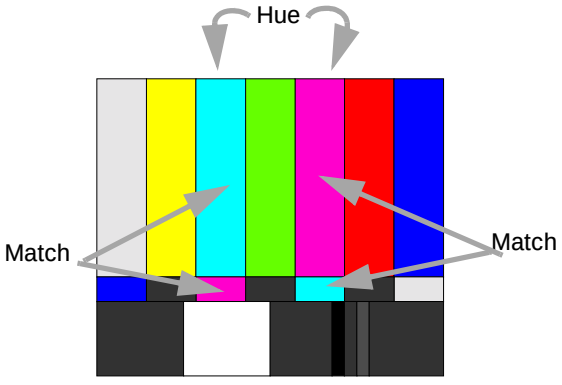
Find Mode, the automatic mode detection process () does not function for C-video and S-video sources. Nor do any of the subparts of Auto Detect.

The LEVEL button opens the Video Controls menu if the current source is C-Video or S-Video





Adjust Saturation so the outside bars match when Blue Only is checked.



Adjust Hue so inside bars match when Blue Only is checked.

4.3.6 Setup for Digital Sources

Digital sources don't need to be adjusted, so this will be very quick.

Adjusting to digital sources

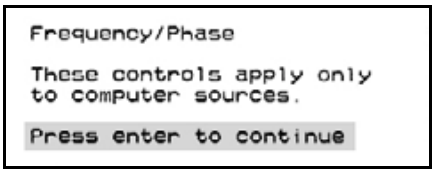
✎ The Digital system does not support the DDC/EDID protocol. If you use a digital source as the input to a video wall, the source must be able to defeat this requirement.

1. Press SOURCE on the remote to open the Source Select menu.
2. Press the left or right arrow key on the remote to select Digital.
3. Press ENTER, which activates the source selection and opens the Mode Detect menu.
4. If. Auto Detect is on, the Lion will start seeking the mode. If it is not on, select Find Mode and press ENTER.

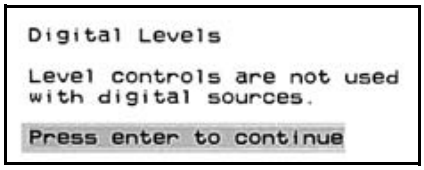
Level and Freq/Phase adjustments to not apply to digital pictures, so these two will not function even if they are on in the Mode Detect menu. Auto Position will run, if it is on.

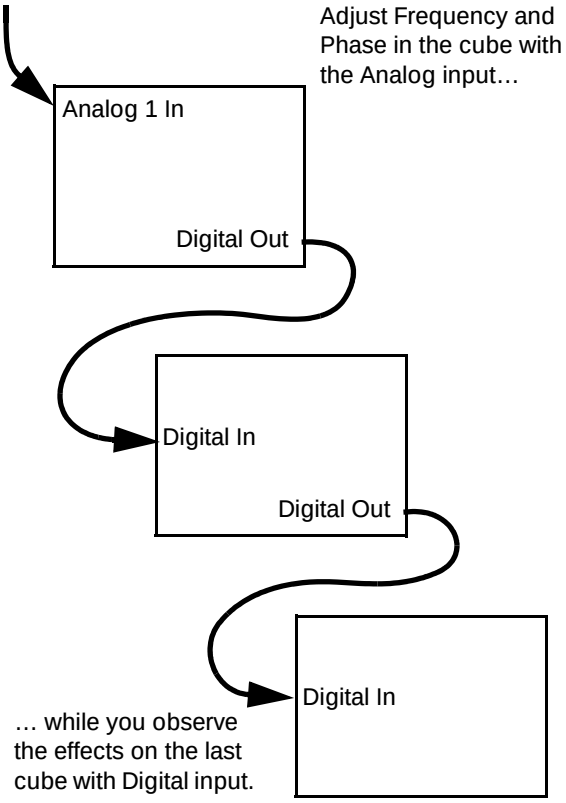
However, the Frequency and Phase of an Analog driven cube ahead of a Digital cube in a series loop-thru is very important. The Frequency and Phase should be adjusted for this first analog cube while watching the effect on the last digital cube.

If you try the FREQ/PHASE button when Digital is the current source, you get:



If you press the LEVEL button when Digital is the current source, you get:




Adjust Frequency and Phase in the cube with the Analog input…
Analog 1 In
Digital Out
Digital In
Digital Out
Digital In
… while you observe the effects on the last cube with Digital input.

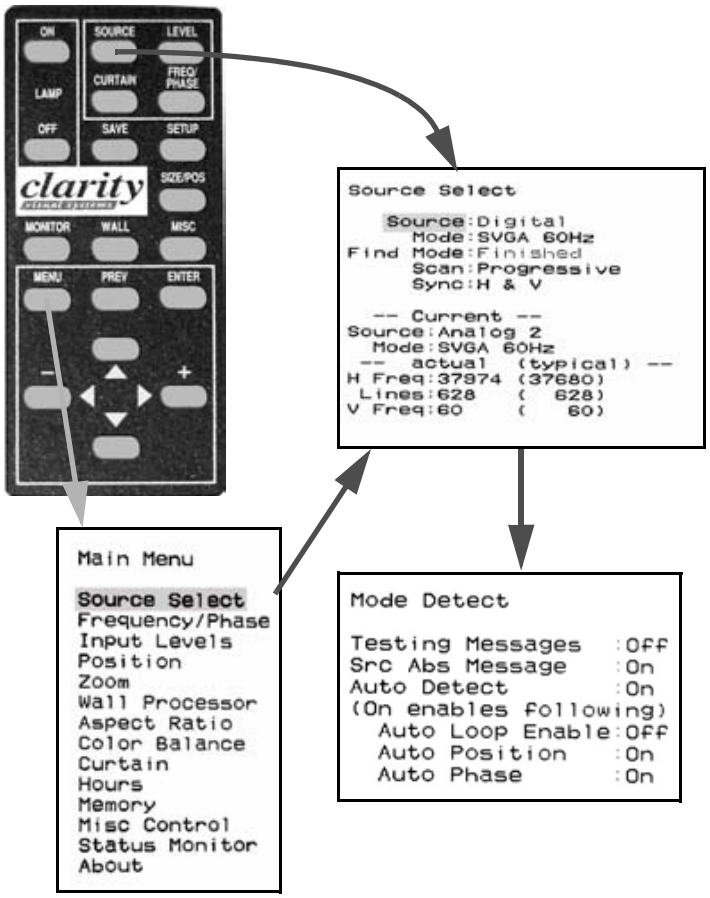
Color adjustment for digital sources

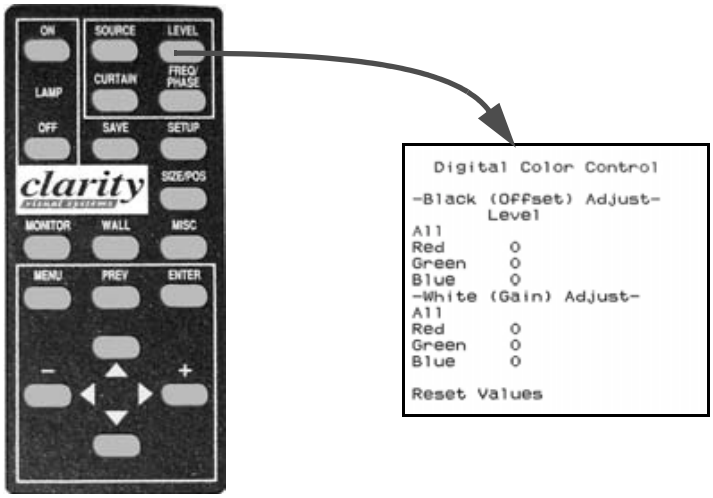
Lion SXP has color adjustments for digital inputs. With a digital source selected in the Source Select menu, press LEVEL. This opens the Digital Color Control menu.

The default for all values is 0. You can adjust any of them up and down in the range –127 to 127. Select Reset Values and press ENTER to reset them all to zero.

Adjusting Black (Offset) determines how much of the darkest pixels will be black. Pushing this too far negative will result in many dark areas of a picture being totally black.

Adjusting White (Gain) determines how much of the lightest pixels will be pure white. Pushing this too far positive will result in many light areas of the picture being totally white.


ON
SOURCE
LEVEL
LAMP
CURTAIN
FREQ/ PHASE
OFF
SAVE
SETUP
clarity
SIZE/POS
MONITOR
WALL
MISC
MENU
PREV
ENTER
Source Select
Source:Digital
Mode:SVGA 60Hz
Find Mode:Finished
Scan:Progressive
Sync:H & V
-- Current --
Source:Analog 2
Mode:SVGA 60Hz
-- actual (typical) --
H Freq:37974 (37680)
Lines:628 (628)
V Freq:60 (60)
Main Menu
Source Select
Frequency/Phase
Input Levels
Position
Zoom
Wall Processor
Aspect Ratio
Color Balance
Curtain
Hours
Memory
Misc Control
Status Monitor
About
Mode Detect
Testing Messages :Off
Src Abs Message :On
Auto Detect :On
(On enables following)
Auto Loop Enable:Off
Auto Position :On
Auto Phase :On

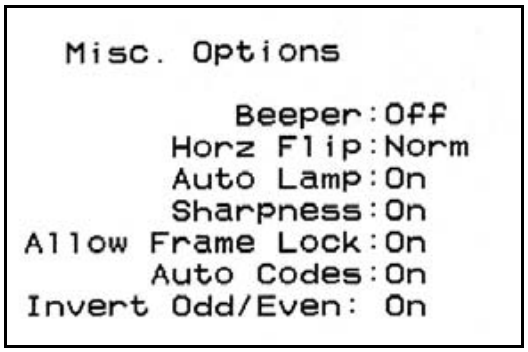

ON
SOURCE
LEVEL
LAMP
CURTAIN
FREQ/ PHASE
OFF
SAVE
SETUP
clarity
SIZE/POS
MONITOR
WALL
MISC
MENU
PREV
ENTER
Digital Color Control
-Black (Offset) Adjust-
Level
All
Red 0
Green 0
Blue 0
-White (Gain) Adjust-
All
Red 0
Green 0
Blue 0
Reset Values

4.3.7 Special Notes for 1080i & 1024i Modes

The HDTV 1080i mode, when selected, activates a feature and changes a couple of the menus.

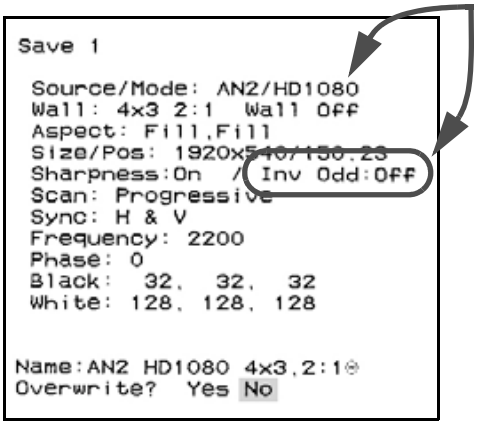
The HDTV 1080i and 1024 × 1024i modes are interlaced, and the Lion sometimes has difficulty determining which field, odd or even, to trigger on. This may cause pictures of these types to incorrectly interlace the odd and even fields, producing a broken looking picture.

This effect appears only in Wall Mode, but it may come and go as you move the picture with Position. To fix this, open the Misc Options menu.



Use the LEFT and RIGHT arrow keys on the remote to turn Invert Odd/Even on and off. This toggle changes which of the two interlaced fields is regarded by the electronics module as the first field. It doesn't matter whether it is on or off, as long as the picture looks right.

The HDTV 1080i and 1024 × 1024i modes also add information to the Save and Recall detail menus (below) and to the Setup Summary menu.



4.4 Setup Part 2: Walls

This part of the setup process is the same for all types of inputs. Some parts, such as Color Balancing, can be done at any time. Other parts must be done in a specific order.

This part of the setup procedure is the same for all input types. However, what you do depends on whether you will use Clarity's Big Picture™.

Some Lions may have the Clarity's Big Picture option and some may not. To determine which parts of the rest of this section you should read, see the table below.

To find out if a display has the Clarity's Big Picture option, do this:

1. Turn on the display, whether or not it has a source.
2. Press MENU on the remote
3. Select WALL PROCESSOR in the main menu and press ENTER.
4. If you see the Wall Processor menu, this display has the Clarity's Big Picture option. Otherwise, you will see a message stating that this display does not have the option.

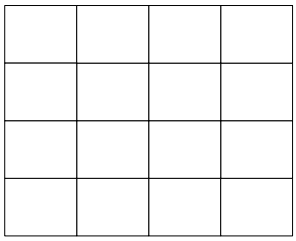
Which sections do you need to read?	If you have only *one* display, not a wall.	If you will *not* use Clarity's Big Picture	If you will use Clarity's Big Picture
Section 4.4.1, "How to Use Clarity's Big Picture™," on page 94	No	No	Yes
Section 4.4.1.1, "About Aspect Ratios," on page 96	Yes	Yes	Yes
Section 4.4.2, "Position Control," on page 100	Yes	Yes	Yes
Section 4.4.3, "Zoom Adjustments," on page 102	No	Yes	Yes
Section 4.4.4, "Matching Colors Across All Displays," on page 104	No	Yes	Yes

About Clarity's Big Picture™

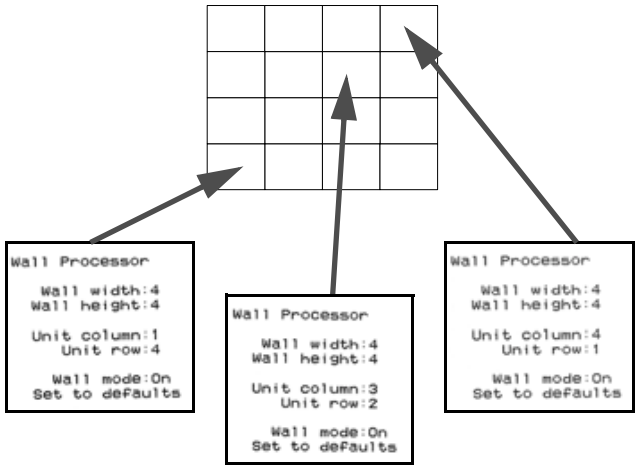
Clarity's Big Picture spreads a single source over many display cubes. You can spread the picture over all the cubes in the wall, or you can limit the spread to just some of the cubes.

There are two ways to think about 'walls.' There is the physical wall, which is all the cubes that are installed together in rows and columns. This doesn't change. There is also the Big Picture wall, which may be all the cubes in the physical wall, or it may be a smaller group of them. The Big Picture wall is defined for each cube in the Wall Processor menu.

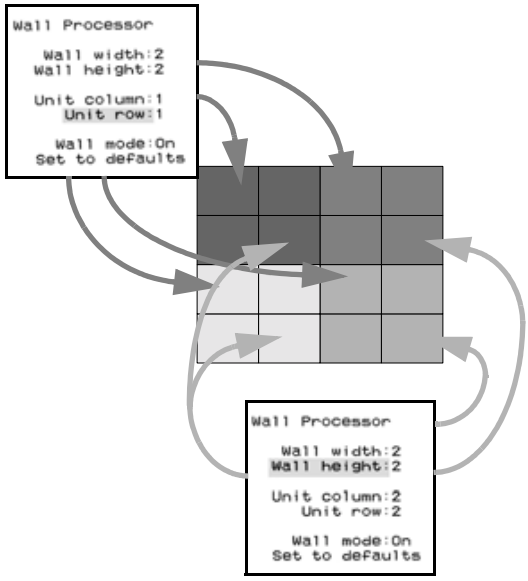
Some examples may make this clear. Here is a 4 × 4 physical wall.



To spread a picture over the entire wall, feed each cube the same picture. Do this either with loop-thru or with a distribution amplifier. In each cube's Wall Processor menu, set the Wall Width to 4 and the Wall Height to 4. Set each cube's Unit and Column to reflect its physical location in the wall.



To spread the four different pictures over separate 2 ×2s within the wall, set the menus this way: Notice

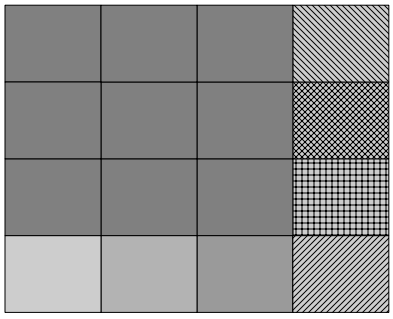


that each menu shows a 2 × 2 wall.

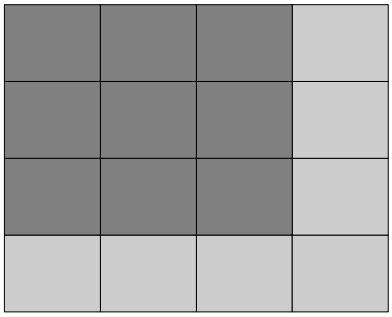
✎ Each cube ‘knows’ the dimensions of the wall and where it is in that wall only from the Wall Processor menu. The cube has no way to know the actual, physical size of the wall.

Each wall configuration can be saved in one of 14 memories.

Many other wall configurations are possible. This wall contains a 3 × 3 picture and seven individual pictures.



This wall has one 3 × 3 picture and a border on two side made from one picture.



4.4.1 How to Use Clarity's Big Picture™

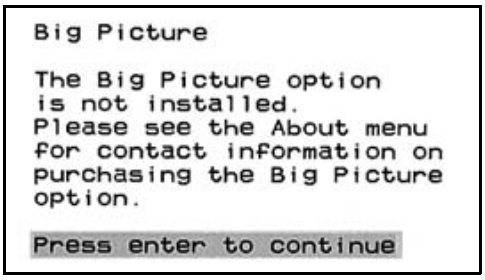
The Wall Processor menu controls Clarity's Big Picture™, which spreads a single input over several displays. You can configure Clarity's Big Picture to cover all the displays, or just some of them, and switch between these settings instantly.

Clarity's Big Picture™ can spread a single picture over the entire wall or just a part of it. In a 2 high by 4 wide wall, you can use Clarity's Big Picture to cover all 8 cubes, or you can make two 2 × 2s, side by side.

How to setup Clarity's Big Picture™

Clarity's Big Picture is controlled in the Wall Processor menu. For *each* display in the video wall press WALL on the remote control.

✎ If Clarity's Big Picture™ option is not installed, you will see this notice.


Big Picture
The Big Picture option is not installed.
Please see the About menu for contact information on purchasing the Big Picture option.
Press enter to continue

1. Wall width and Wall height define the size of the wall, the number of displays horizontally and vertically. Use the + and – keys to set these values the *same* for all displays in the wall. These settings will be the same for all displays in the wall.

✎ It is not necessary to have a 'square' wall. The wall can be 2 high and 4 wide, or 5 high and 1 wide. Of course, this will distort the source picture, unless the source picture is designed to stretch in this way.

2. Unit column and Unit row define the position of each individual display in the wall. These settings will be different for each display in the wall. Use the + and – keys to set the column and row for each cube separately.
3. Press ENTER when any item (except Set to defaults) is highlighted. You must do this for each cube.

The edges might not fit together exactly right when you first activate wall mode. This is normal.

To make minor adjustments to the wall mode picture, use Position and Zoom. To make these adjustments, it helps to have some kind of geometric pattern on the screen.

If the input is from a computer, you can make a useful geometric pattern with the Windows Paint program. Fill the screen with rectangles, circles and random straight lines at various angles. Make the lines go all the way across the whole video wall. You want patterns that cross the boundaries between displays so you can line things up.

If the input is from a video source, use a video test pattern. Color bars are not very good for this purpose. You want something with more detail. Cross-hatch or convergence might sound like the ideal pattern, but it is easy to be off by one rectangle. If no test pattern is available, try a still picture with lots of detail. It is hard to make minor adjustments to a video wall with a moving or changing picture.

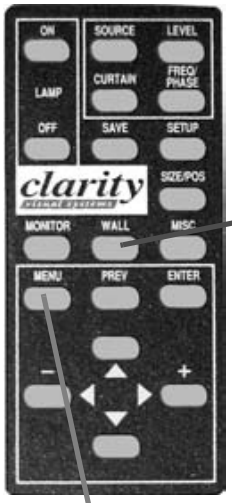
About saving the Wall Processor settings

The Wall Processor settings are not saved in the same form you see in the menu. Wall Processor uses the wall height and width and the location of the individual cubes to calculate a zoom amount and a position for each cube.

It is the Zoom and Position values that are saved, along with the wall size and cube location, when you save the settings. These values are saved in one of the numbered memories.

Set to defaults

In the Wall Processor menu, Set to defaults turns off wall mode and sets the wall size to 1 × 1.




```
Wall Processor

   Wall width:4
  Wall height:3

 Unit column:1
    Unit row:2

   Wall mode:Off
 Set to defaults
```

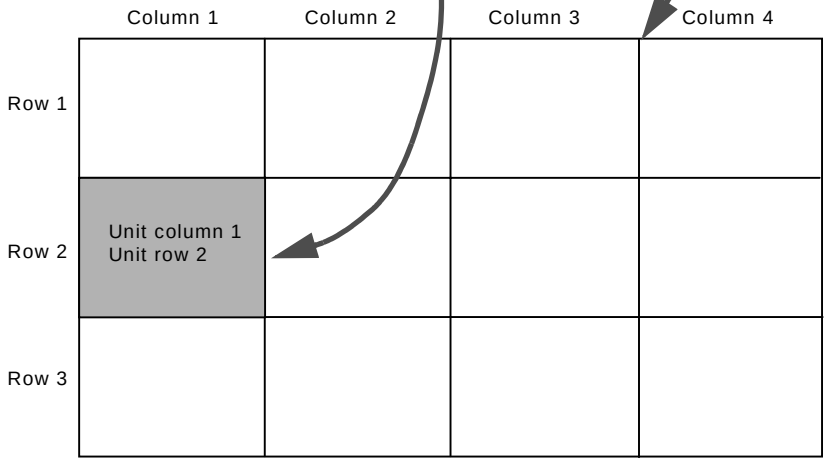
```
Main Menu

Source Select
Frequency/Phase
Input Levels
LCD Alignment
Position
Zoom
Wall Processor
Aspect Ratio
Color Balance
Curtain
Hours
Memory
Misc Control
Status Monitor
About
```

The wall settings in this menu…

define a cube in a wall shaped like this…

in this position.

3 x 4 video wall
Wall width: 4
Wall height: 3



✎ If the selected source is HDTV 1080i, an additional choice appears in the Wall Processor menu as described in 'Special Notes for 1080i & 1024i Modes' on page 94.

4.4.1.1 About Aspect Ratios

Aspect ratio is the width of a picture divided by its height. When the aspect ratio of the source picture differs from the aspect ratio of the Lion screen, something must be done to make the picture fit the screen.

The aspect ratio of the Lion UXP screen is 4:3, referred to as 1.33.

Aspect ratio is ratio of the width to the height of the screen, expressed as two whole numbers (4:3, 16:9) or a decimal number (1.33, 1.77). To find the aspect ratio of any screen or wall of screens, divide the width by the height: $W \div H = Aspect\ Ratio$

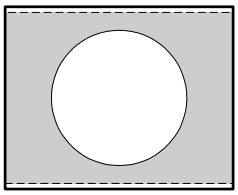
When aspect ratios are not the same

When the aspect ratio of the source picture is not the same as the aspect ratio of the cube (or of the wall, if using Big Picture), the picture will not fit the screen. You have several choices:

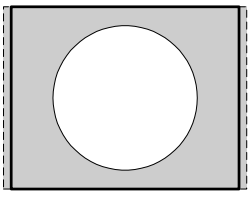
Source aspect ratio is greater

When the source picture's ratio is greater than the cube or wall (for instance, source 1.33, cube 1.25) you have choices such as these:

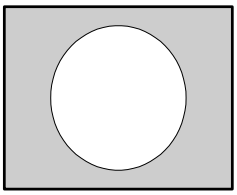
1. Fill the screen for width without distortion and leave space at the top and bottom. The system expands the picture horizontally until it fits the screen: no distortion.



2. Fill the screen for height without distortion and let the sides be cropped off. The system expands the picture vertically until if fits the screen: no distortion.



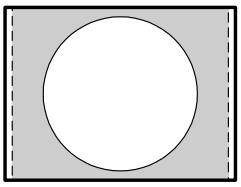
3. Fill the screen for width and stretch it to fit vertically. The system expands the picture horizontally until it fits the screen, then stretches it to fill the screen vertically: some distortion results.



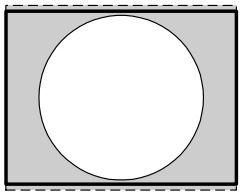
Source aspect ratio is smaller

When the source picture's ratio is less than the cube or wall (for instance, source 1.25, cube 1.33) you have choices such as these:

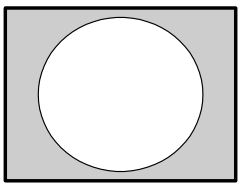
1. Fill the screen for height and leave space at the sides.



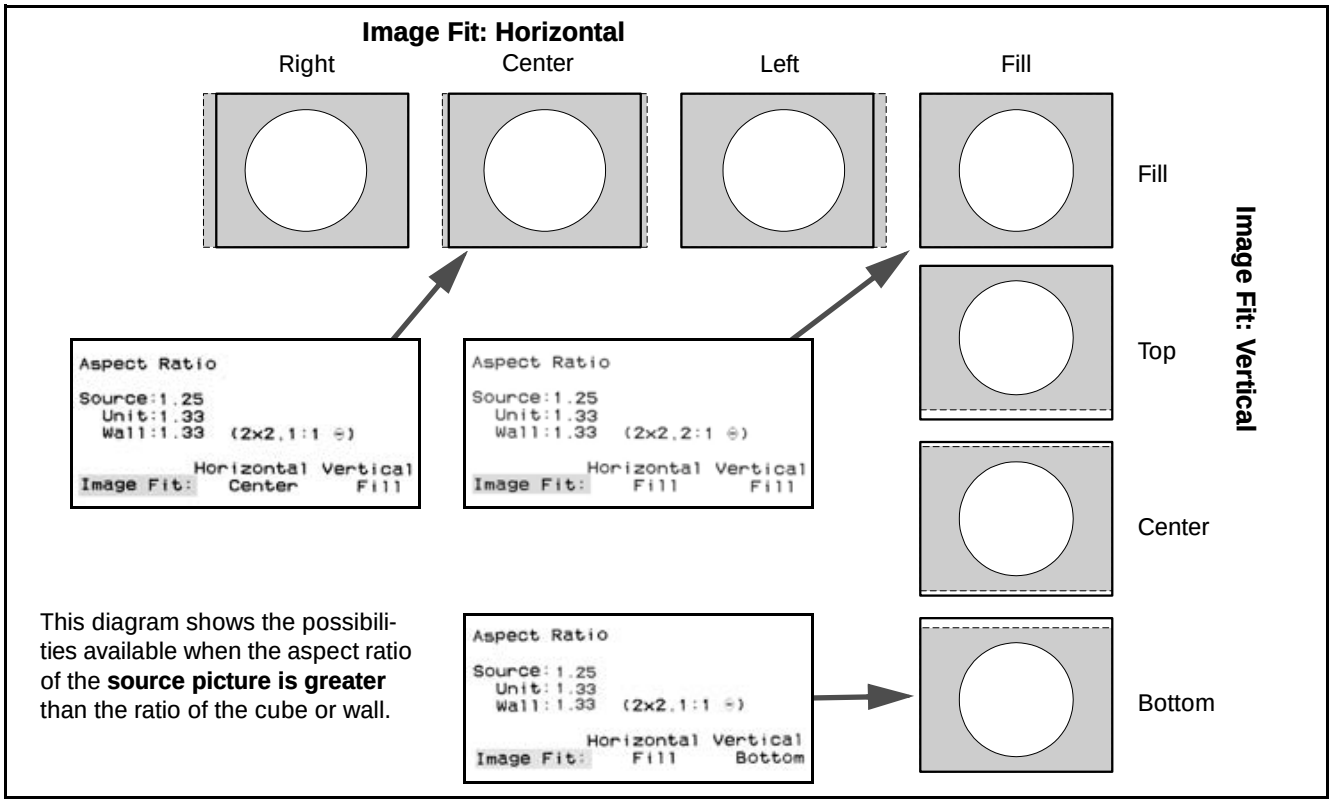
2. Fill the screen for width and let the top and bottom be cut off.



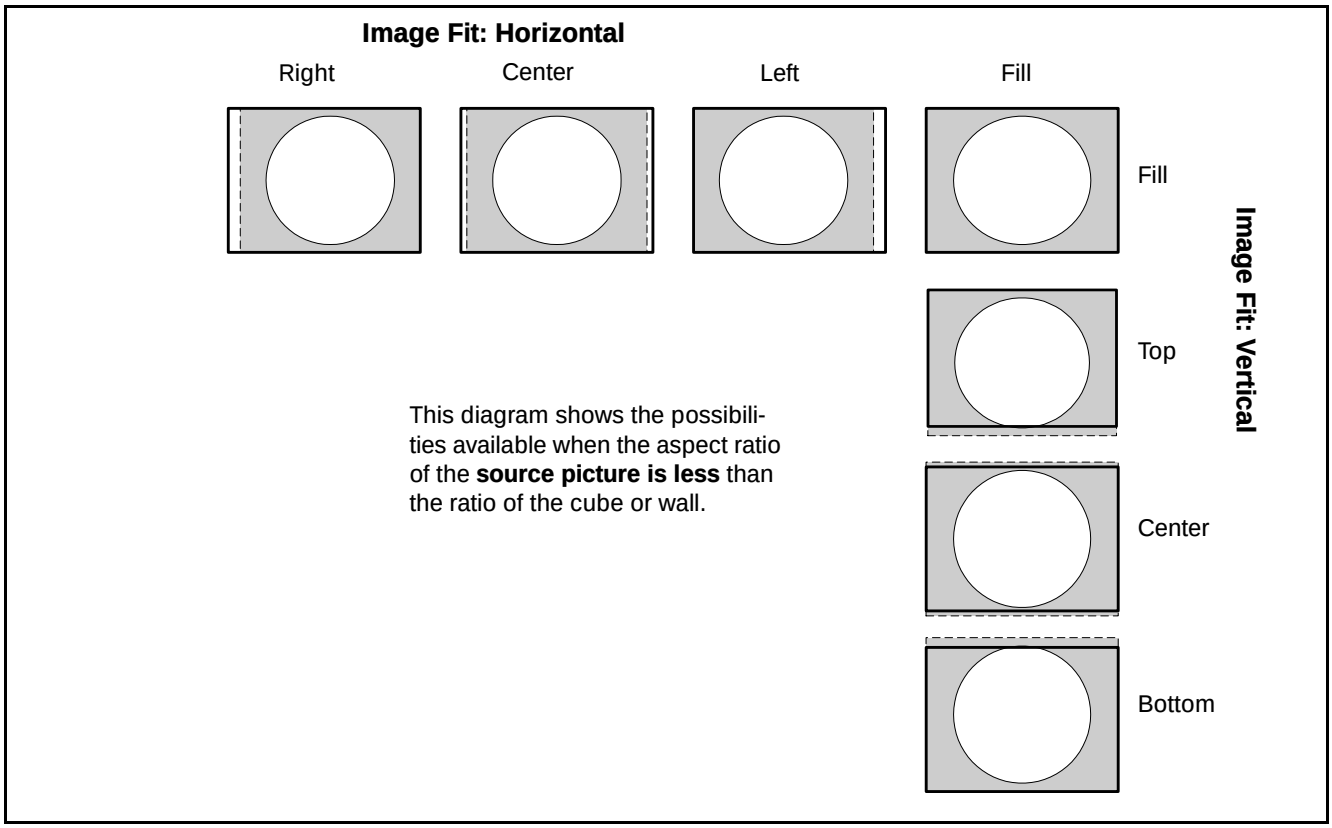
3. Fill the screen for height and stretch it horizontally to fit. This produces some distortion.



In the Aspect Ratio menu, described in the next section, you choose how you want to display the picture. The background color, which shows in strips at the top and bottom in example 1, is taken from the User Curtain color. (You will learn how to set this color in .)



This diagram shows the possibilities available when the aspect ratio of the **source picture is greater** than the ratio of the cube or wall.



This diagram shows the possibilities available when the aspect ratio of the **source picture is less** than the ratio of the cube or wall.

4.4.1.2 Making the Image Fit the Screen

In the Aspect Ratio menu, you decide how the system will handle source pictures that have an aspect ratio that is different from the cube or wall. You must set Aspect Ratio for each cube in a wall.

The default condition for Aspect Ratio is fill-fill. The highlight is placed on Image Fit and cannot move. If this type of image fit is not suitable:

1. Press WALL twice on the remote. This opens the Aspect Ratio menu.
2. Use the + and – keys (left-right arrows) to cycle through the seven image fit choices.

Source shows the aspect ratio of the source picture, that is, its width divided by its height.

Unit shows the aspect ratio of the display. This is for reference only; it will always be 1.33 for

Wall shows the following:

- the aspect ratio of this wall;
- the number of displays in the wall, width × height, taken from the settings in the Wall Processor menu;
- the location of this unit in the wall shown as column:row;
- whether Wall Mode is on (+) or off (–).

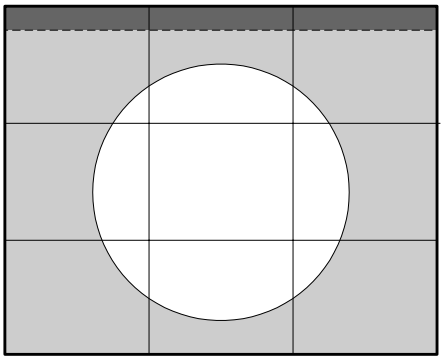
Note that the Wall data is the same whether Wall Mode is On or Off.

Aspect Ratio in Big Picture

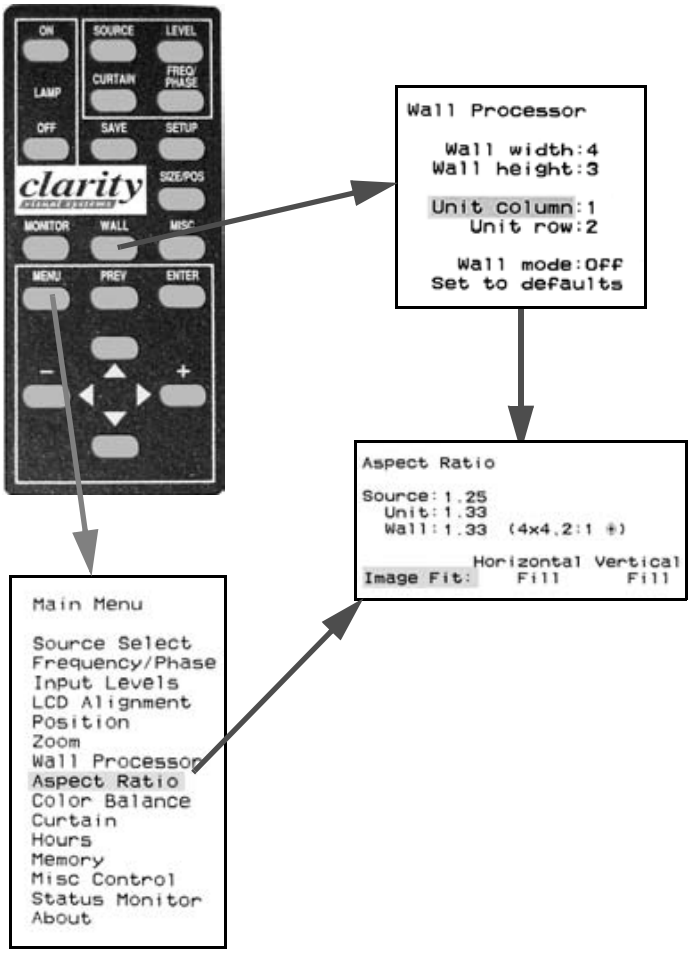
Aspect Ratio also applies to Clarity's Big Picture™. How this works is best demonstrated with an example. Assuming the following:

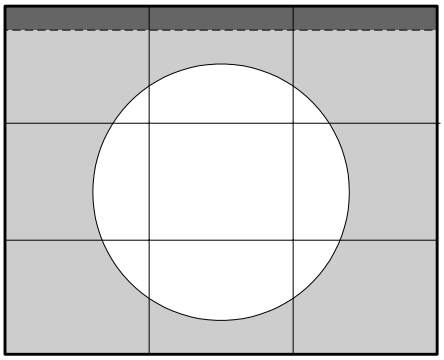
- Display is a Lion UXP.
- Source picture is SVGA, 800 × 600.
- Horizontal image fit is Fill.
- Vertical image fit is Bottom.

The Big Picture will fill the wall like this:

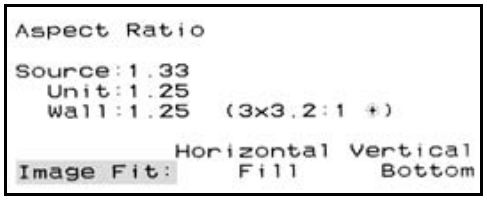


The image will have no distortion. The color of the strip at the top is the User Curtain color. For some walls and some aspect ratio settings, a cube may have no picture in it. In a wall 3 high by 1 wide, if the aspect ratio settings were Horizontal fill and Vertical bottom, the top two cubes would have none of the source picture; they would show only the User Curtain color.





A 3 × 3 wall with Wall Mode On. Each cube must have the Aspect Ratio menu set up as shown. The strip at the top will be the User Curtain color.



4.4.2 Position Control

The Position Control moves the image electronically on the LCD. The LCD must be aligned to the screen mechanically first.

To open the Position control, press SIZE/POS on the remote. Use the four arrow keys to move the image in any of the four directions. This is electronic movement.

✎ If you try move the image into a black area on the screen to fill it, and the image just disappears into the black, see 'An Important Step: Aligning the LCD' on page 74. This will tell you how to mechanically adjust the LCD, which you should do before you adjust Position.

Position movement accelerates as you continue to hold one of the arrow keys.

✎ If you are using Clarity's Big Picture, first adjust the Position with Wall Mode Off. Then set the position with Wall Mode On.

Find Position

Find Position is a way to automatically move the upper left corner of the picture to the upper left corner of the screen (really, the upper left corner of the LCD).

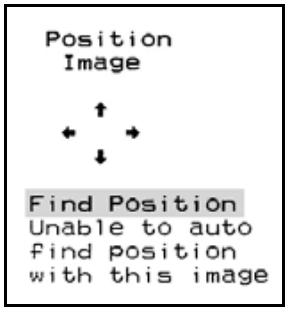
To use this feature, press ENTER, which highlights Find Position. Then press it again to activate the finding feature.

✎ The arrow keys in the Position control cannot move the highlight selector to Find Position, because they are used to move the image.

In some pictures, such as the Windows shutdown screen, it is not possible for the system to find the upper left corner of active picture. If this occurs, the system will display a message telling you that it did not adjust position.

If Find Position fails

If Find Position results in the error message, you



will have to position the picture manually. The picture may have the black edges, which Find Position can't use. Many types of video players—DVDs, Laserdiscs—produce pictures with a non-standard number of pixels. These display fine, but Find Position doesn't work automatically with on them.

Set Position with Wall Mode off first

'Position' is stored separately for two conditions: with Wall Mode on and with Wall Mode off. To save time and trouble, first adjust the Position with Wall Mode off. Then turn Wall Mode on, set the Aspect Ratio setting you want, and make any fine adjustments to position if needed.

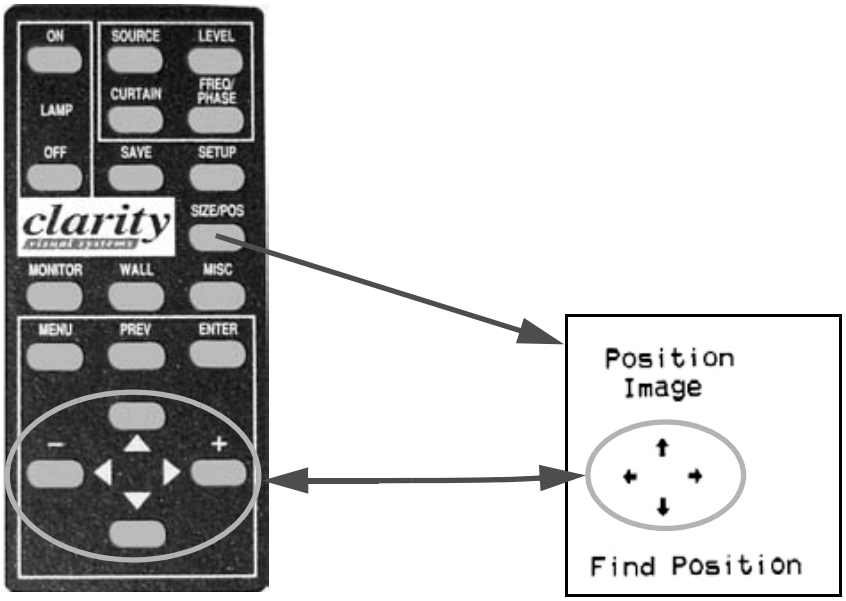
✎ The Position control will not move the picture over the User Curtain.

Possible Position problem

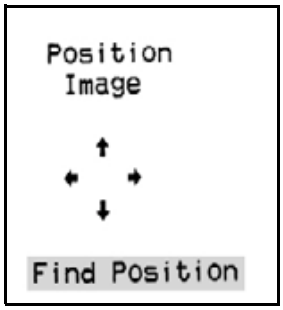
Some PC sources have a vertical line of white pixels in the blanking part of the field. Because Find Position is looking for a black vertical interval, this can throw off the automatic position finding system.

If you use Auto Position and the picture is off to the right, leaving a black band on the left, move the picture further to the right to see if there is a visible vertical line on the left edge of the screen.

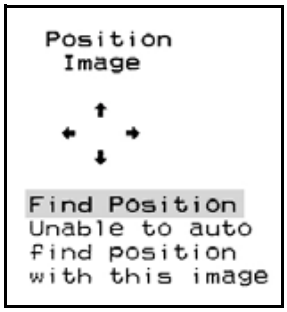
If there is, this white line defeats the automatic Find Position system, and you must position manually.



Press and hold an arrow button to accelerate image movement.



To set position automatically, press ENTER once to highlight Auto. Press it a second time to activate the process.



If the system cannot auto position, you will see this message.

4.4.3 Zoom Adjustments

Zoom is used to make minor adjustments in individual displays to make the edges of pictures match correctly in a wall. Clarity's Big Picture™ does most of the zooming for you.

Zoom is not an optical zoom, it is electronic. Clarity's Big Picture™ feature, controlled by the Wall Processor menu, does most of the zooming for you as you set up the wall. Use the Zoom menu to make minor adjustments.

If you do not have Clarity's Big Picture, then the amount you can zoom is very limited.

If you don't use Clarity's Big Picture

When you use some other method, such as an external processor, using the zoom controls will scale the picture and may soften the image. Whenever possible, use one the Position controls for adjust the picture to reduce this effect.

Zoom controls

The **Width** and **Height** controls operate on one edge only. If you adjust the Left edge, the right side stays in place, and the picture expands (or contracts) on the left side.

If **Centered zooming** is On, then the Width and Height controls operate on opposite sides at the same time. That is, the Left edge or Right edge control will stretch or contract the picture from the middle. The middle of the picture stays where it is.

Set to defaults returns the zoom amounts to the values required by the Wall Processor settings.

Values in the Zoom menu

The numbers shown for Width and Height show the total number of active picture elements on the screen. The numbers for top, bottom, left and right edges show the actual pixel location of the screen edges referenced to a 0 position located in vertical and horizontal blanking. These edge numbers are the values used in RS232 commands that define the position of the image on the screen.

In a 2 × 2 wall using Clarity's Big Picture with an 800 × 600 source, and a zoom factor of 2:1. The values in the menu will be 400 and 300, because each cube is displaying only 400 of the source's pixels in width and 300 pixels of the height. But see 'Zooming smaller than normal' below.

How to use the Zoom Control

When adjusting a video wall, use a test pattern that has circles and diagonal lines. Grid patterns are not very helpful, because you can be off by one whole grid box and not know it. Still pictures are best. Moving pictures make it very hard adjust zoom and position.

Use Windows™ Paint program to draw boxes, ellipses, and diagonal lines. Make the lines different colors, and place them randomly on the screen.

Display the pattern over the whole wall. Check the center unit first. Use this as a baseline for adjusting the other units.

Notice how the edges of the baseline unit and how the neighboring units match it. Adjust the neighboring units with Position first.

Then adjust Zoom, which will stretch the picture to make the edges match all the way.

Fine tuning the wall

You may have to go back and forth between Position and Zoom to get the pictures to fit together over the whole wall. Start with a display near the middle and work your way outward in all directions.

Remember, it is best to first adjust Position with Wall Mode off, then turn Wall Mode on and adjust Position and Zoom.

When you adjust Position, you may find that part of one side lines up correctly, but another part of the same side does not. Try adjusting Zoom to stretch or shrink the picture. Then adjust Position again.

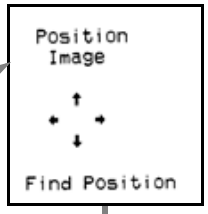
Zooming smaller than normal

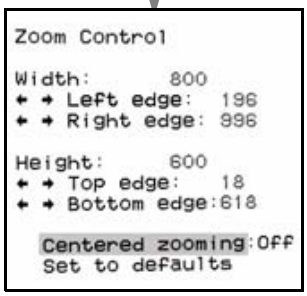
In Lions it is possible to zoom the source picture smaller. For instance, if you needed to zoom out on an 800 × 600 picture to make it smaller, the numbers in the zoom menu should become larger than 800 and 600.

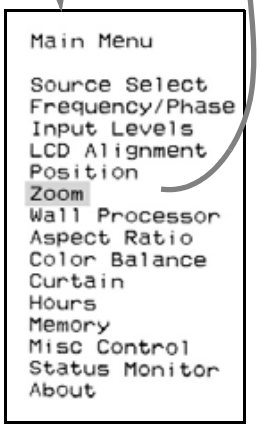
However, there are no more active picture elements, so the Zoom menu represents this as 3+800 +5 (shown opposite) if you zoomed out 8 pixels horizontally (3 on left edge and 5 on the right). The user curtain color fills in for the absent picture elements.

If you zoom smaller than normal on the left side and then on the right side, and you later decide to undo this, you must zoom larger on the left side and the right side to get back to a normal-sized picture.

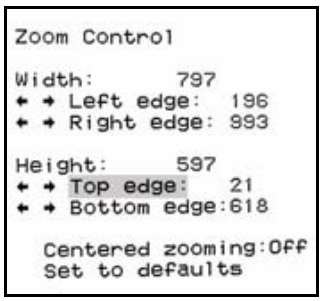
Adjusting position, changing aspect ratio or wall parameters will force the zoom to return to the default position.





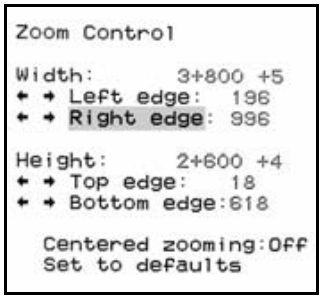


This Zoom Control menu shows the full picture made *larger* than normal. The Width display is 3 pixels smaller than the number of source pixels and the Height display is 3 pixels smaller then the number of source pixels. The numbers next to the left, right, top, and bottom edges are the pixel locations that need to be included in RS232 commands used to set zoom positions.



This Zoom Control menu shows the full picture made *smaller* than normal. The Height display is 6 pixels more than the number of source pixels, 2 pixels on the top edge and 4 pixels on the bottom. This makes the image shrink vertically. The Width display is 8 pixels more than the number of source pixels, 3 pixels on the left edge and 5 pixels on the right. This makes the image shrink horizontally. The extra rows of pixels are filled in the with User Curtain color.

Adjusting position, changing aspect ratio or wall parameters will force the zoom to default.



4.4.4 Matching Colors Across All Displays

Color Balancing matches the color characteristics of the lamps and optics so all displays in a wall look the same. When you match the displays for White and Gray, all the other colors will be the same across all displays.

The goal of color balancing is to make all the displays show the same colors so that a red car driving across the picture does not change from red to maroon to pink as it traverses the screens.

✎ Do NOT use Black Level and White Level to try to adjust colors between displays. These levels must be set properly for proper color, but you do not adjust the color with them. The Level controls only match the electronics of the cube to the incoming computer picture.

✎ Color balancing can be done anytime after the wall is built. It does not require LCD alignment, Level adjustments or anything else. It doesn't even require a source picture, because you use internal test patterns.

How to color balance

On *all* the cubes:

1. Turn on all the lamps in all the cubes and allow them to stay for at least 5 minutes.

✎ If you plan to use only 1 lamp as the normal illumination, then turn on just one lamp in each cube.

2. Press SETUP repeatedly until you see the Color Balance menu.
3. In the Color Balance menu, press the right arrow key to get to the White test pattern.

✎ It is sometimes difficult to control one cube at a time with the remote control. You may have to get close. Some installers have had success using a cardboard tube over the end of the remote to control the cubes separately.

4. Press the down arrow twice to highlight Reset values in the menu. This makes all the White balance 031 and all the Gray balance 007.
5. Select Hide menu and press ENTER on each display. This will remove all the menus so you can see the whole screen on all displays.

✎ When the Color Balance menu is hidden, the test pattern remains. To bring the menu back, aim the remote at the one screen and press ENTER.

Now work on *individual* cubes.

6. Look at all the displays together. Stand far enough away from the wall so you are looking almost squarely at all of them. Move around. Try to look at all the cubes from the same viewing angle.
7. Find the darkest display. Think of this as the *baseline* display. It is now as bright as it can be; you will adjust all the other displays to look like this *baseline* display.
8. Pick a display next to the baseline display. This will be the *variable* display. Turn on the Color Balance for this *variable* display.
9. Match the brightness of the variable display to the baseline display.
   - Match brightness first. Move the highlight to Adjust all under White Balance.
   - With the left key, reduce the brightness until it matches the baseline display.
   - Select the individual colors and adjust the amounts of Red, Green and Blue to achieve the best match in color and brightness to the baseline display.

To add more …	do this
yellow (amber)	reduce blue, or add more red and green
magenta (purple)	reduce green, or add more blue and red
cyan (sea green)	reduce red, or add more green and blue

10. When the first variable unit matches the baseline unit, it becomes another baseline unit. Turn off its Color Balance menu.

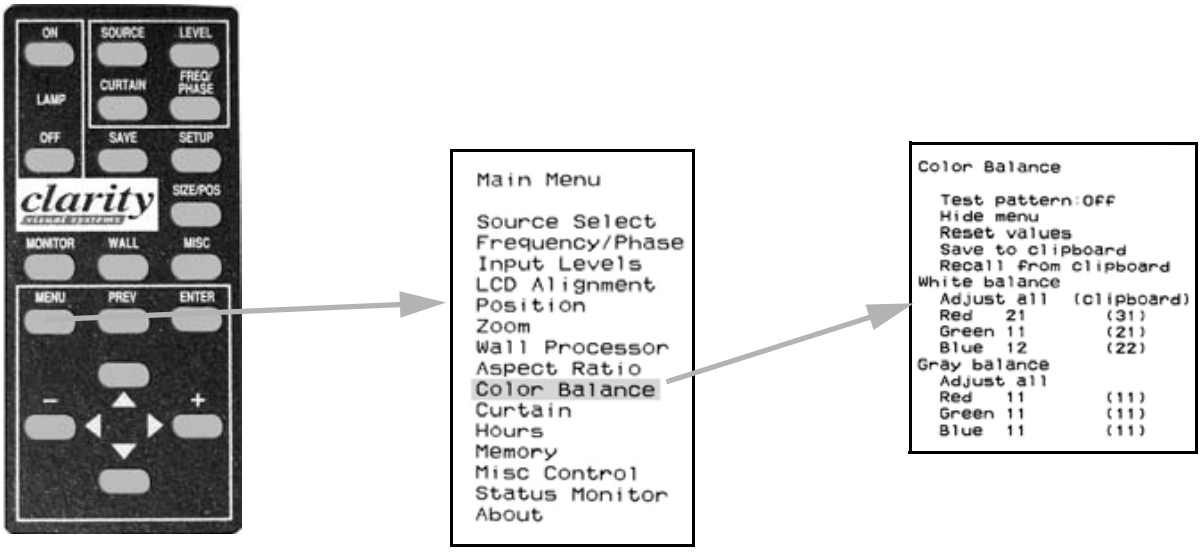
Continue with the other displays.

11. Choose another variable unit next to any baseline display, turn on its Color Balance menu, and match its white to any baseline display.

Finished with White, then do Gray.

12. When all displays match in white, use the Test Pattern menu to choose Gray so all the displays show an internal gray pattern.

13. The gray values range from 000 to 015, and they are all now set at 007. Therefore, gray can be adjusted up and down. Choose a display that has a middle brightness and that has very little color in gray. This becomes the first baseline display for gray. It is not necessarily the same one as the baseline cube for White.
14. Proceed as before, matching the grays one display at a time. *Always* work with adjacent displays.
15. When all displays match in gray, turn off the test pattern on each display with the top item in the Color Balance menu.
16. Save your work. 'How to Save Your Work' on page 108.



The clipboard

The clipboard on the Color Balance menu gives you a place to temporarily store all the color balance settings for the display.

If you want to experiment with another setting—to see if it looks better than the present setting—select "Save to clipboard" and press ENTER. The clipboard values will now match the current settings.

Adjust and experiment all you want. If you find something better, fine. If you want to go back, select "Recall from clipboard" and press ENTER. All your old values are reinstated.

✎ The clipboard values are *not* saved when AC power is turned off.

4.5 Setup Part 3: Saving

Now that you've done all that work, save it. Save your work often. The memory has 72 locations for storing the settings—Source, Black Level, Wall Processor, Position—everything, or almost everything.

The settings—everything you change, such as Black Level, Color Balance, Mode—are saved in three ways, as explained below and in the diagram opposite.

- **Current Settings memory**: Every time you close the last menu, so that no menus are present, all the settings are saved. If you leave a menu on the screen and do not use the remote for 5 seconds, the settings are saved. Any changes made with RS232 or through the action of Auto Detect are saved. If AC power goes off, when it comes back on the Current Settings memory is loaded into Active Settings.
- **Source Memories**: Every time the source is changed, the Active Settings are saved to the previously selected Source Memory. Then Active Settings is loaded with the newly selected Source Memory.
- **Memories 1–72**: You can save settings in 72 numbered memories. Any numbered memory can be associated with any input connector. This is the best way to save lots of different configurations for a wall that must change during a program.

Active Settings is RAM. Whatever is here determines how the picture is displayed. All memories store settings from this RAM and recall settings to it.

The table shows what is saved in the **numbered memories**, what is saved **globally**, and what is **not saved** in the memories at all. Everything saved in numbered memories is also saved in **source memories** when the source is changed.

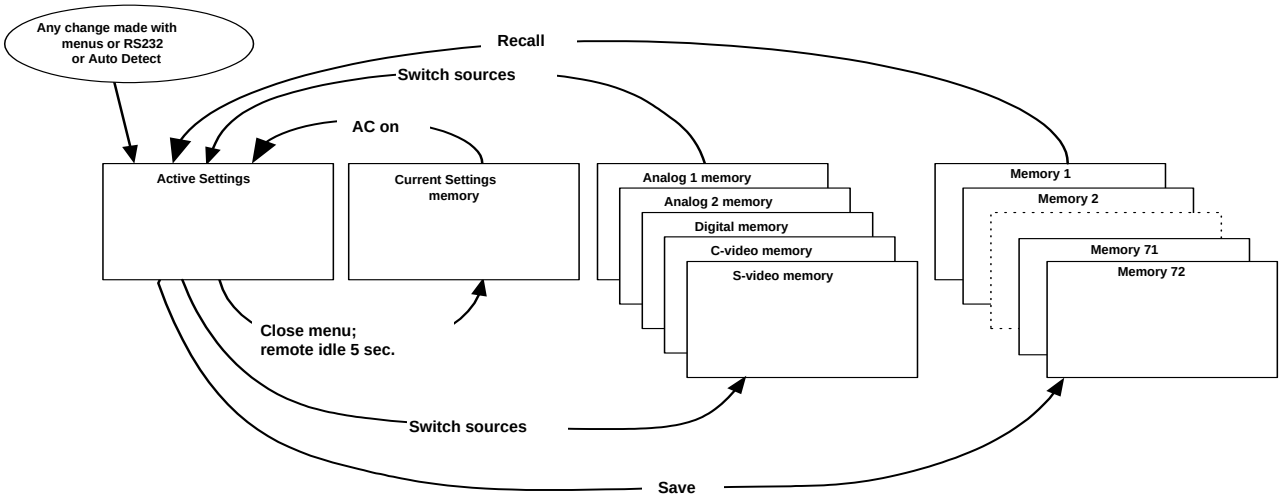
Some things are saved **globally**, such as color balance values and baud rate.

Some items are **not saved** in memories. Lamp Hours, Runtime Hours and System Hours are remembered continuously. These values are not associated with the memories that you save manually.

The LCD Alignment menu, which adjusts image position and rotation, is 'saved' only in the sense that this is a mechanical adjustment that stays where you put it.

Where is it saved?	In numbered memory	Globally	Not saved
Aspect Ratio	×		
Black Level	×		
Brightness, Contrast, Hue, Saturation	×		
Frequency, Phase	×		
Input connector used	×		
Mode (source type)	×		
Position	×		
Sharpness on/off	×		
Wall Mode active	×		
Wall, Unit, Column & Row	×		
Wall, Width & Height	×		
White Level	×		
Zoom settings	×		
Auto Lamp on/off		×	
Baud Rate		×	
Beeper on/off		×	
Color Balance		×	
Curtain Colors		×	
Horizontal Flip		×	
Lamp Count, Lamp Control on/off		×	
Mode Detect settings		×	
RS232 Address *		×	
Color Balance Clipboard			×
Curtain on or off			×
IR Disable			×
Lamp, System, Runtime Hours *			×
Test Pattern			×

* see text


Any change made with menus or RS232 or Auto Detect
Recall
Switch sources
AC on
Active Settings
Current Settings memory
Analog 1 memory
Analog 2 memory
Digital memory
C-video memory
S-video memory
Memory 1
Memory 2
Memory 71
Memory 72
Close menu; remote idle 5 sec.
Switch sources
Save

4.5.1 How to Save Your Work

Save stores information in numbered memories. Some items, such as color balance values, are stored globally, without reference to the numbered memories.

To save the current configuration of the display:

1. Press the SAVE button twice.

✎ Be sure to press SAVE two times. Look for the red labels and the word 'Save' at the top.

2. Arrow up, down or sideways to highlight the number you want to save in. If the memory is not currently used, it will be unchecked. Otherwise the box will be checked and bolded. Press ENTER. This opens the Save detail menu for that one memory number.
3. If the memory you are saving to …
   - was empty, the highlight is on Save Yes. Press ENTER.
   - already had something saved in it, the highlight is on Overwrite No. Press left or right and then press ENTER.

Custom naming the memories

The default label for a memory is a very abbreviated list of its contents. You may want to change the label to something more appropriate to your application. After Step 2. above, do the following:

1. Press the up arrow. This puts the highlight on Name.
2. To erase the current name, press ENTER. Then use the up-down arrows to cycle through the available letters, numbers and punctuation. Use the left-right arrows to navigate along the line.
3. When the name is complete, press ENTER. This puts the highlight on Yes.
4. Press ENTER again to save the settings in this numbered memory with the label you wrote.

It is not required to erase the whole label before writing a new one. You can edit the current label. When the highlight goes to Name in Step 1., move the cursor left or right to the label and start writing. There is no delete key or backspace key. To delete characters, find the space character in the cycle.

To delete a memory:

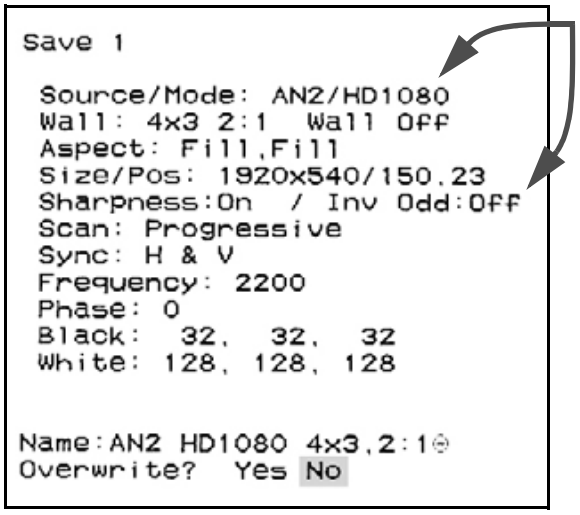
5. Press MENU on the remote control.
6. Select Memory from the Main menu.
7. Select Delete from the Memory menu.
8. Arrow up, down or sideways to highlight the memory number you want to delete.
9. The detail of what you are about to delete is shown. Highlight Yes and press ENTER to delete this memory.
10. The focus goes back to the main Delete menu and the memory you just erased is unchecked and no longer bold.

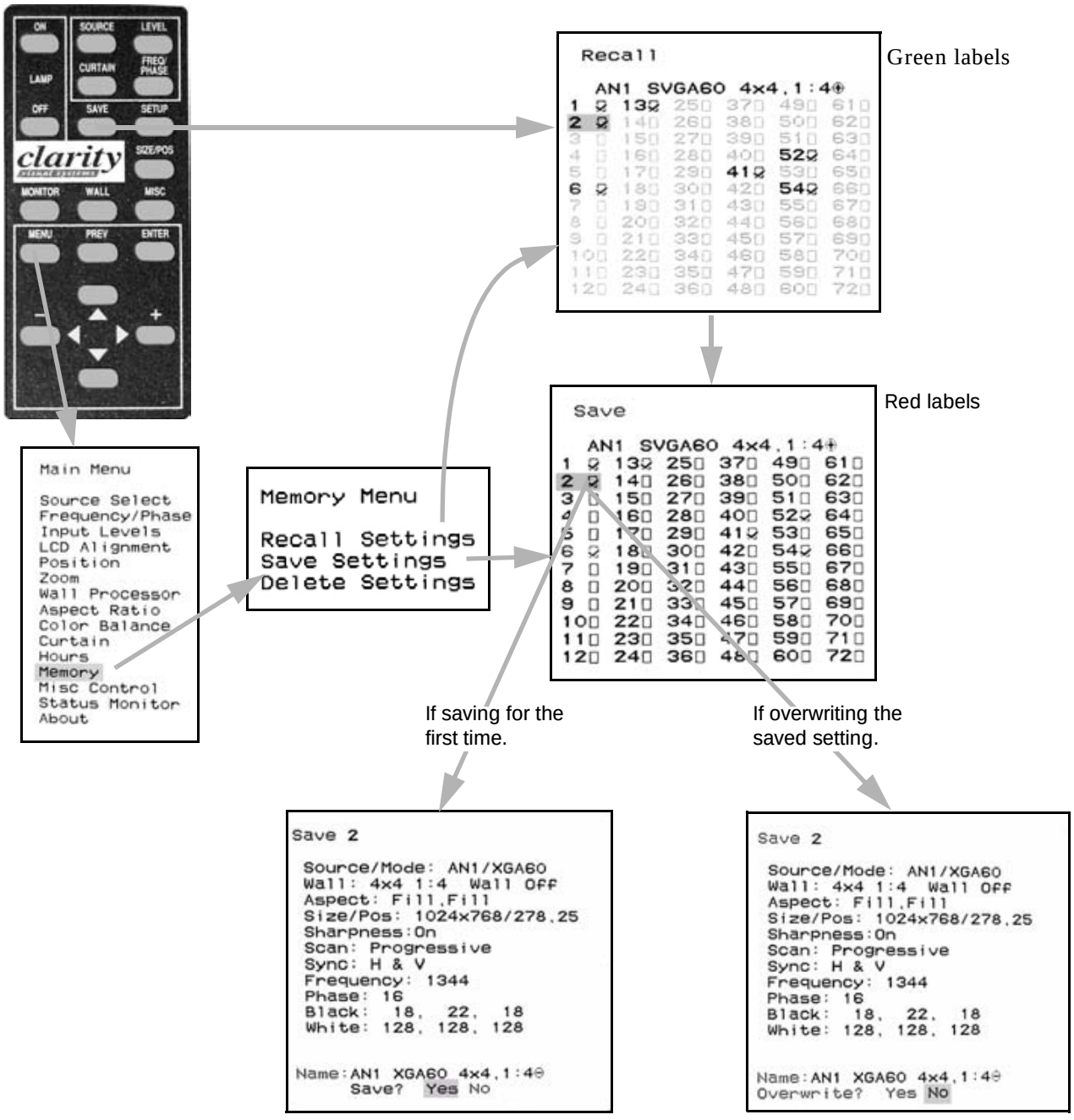
When should I save?

It is a good idea to save often. As you set up each display in a wall, save several times. This way, if something happens, you will have the saved values to recall.

- Black and White Levels—If you change computers for the source, or you change video output cards, or even if you switch connections around on the source computer, save again. If you are using this source computer in several numbered memories, re-save each memory.

✎ If the selected source is HDTV 1080i, there will be an additional item in the Save and Recall detail menus, as shown below.




ON
SOURCE
LEVEL
LAMP
CURTAIN
FREQ/ PHASE
OFF
SAVE
SETUP
clarity
SIZE/POS
MONITOR
WALL
MISC
MENU
PREV
ENTER
Main Menu
Source Select
Frequency/Phase
Input Levels
LCD Alignment
Position
Zoom
Wall Processor
Aspect Ratio
Color Balance
Curtain
Hours
Memory
Misc Control
Status Monitor
About
Memory Menu
Recall Settings
Save Settings
Delete Settings
Recall
AN1 SVGA60 4x4,1:4
Green labels
Save
AN1 SVGA60 4x4,1:4
Red labels
If saving for the first time.
If overwriting the saved setting.
Save 2
Source/Mode: AN1/XGA60
Wall: 4x4 1:4 Wall OFF
Aspect: Fill,Fill
Size/Pos: 1024x768/278,25
Sharpness:On
Scan: Progressive
Sync: H & V
Frequency: 1344
Phase: 16
Black: 18, 22, 18
White: 128, 128, 128
Name:AN1 XGA60 4x4,1:4
Save? Yes No
Save 2
Source/Mode: AN1/XGA60
Wall: 4x4 1:4 Wall OFF
Aspect: Fill,Fill
Size/Pos: 1024x768/278,25
Sharpness:On
Scan: Progressive
Sync: H & V
Frequency: 1344
Phase: 16
Black: 18, 22, 18
White: 128, 128, 128
Name:AN1 XGA60 4x4,1:4
Overwrite? Yes No

4.5.2 Recalling What You Saved

Recalling a numbered memory immediately sets all the values to what you previously saved.

;The preferred way to change sources, after initial setup, is to recall a memory. This is more efficient than changes sources in the Source Select menu.

To recall a memory

1. Press the SAVE button once.

> ⚠ *CAUTION*
> Be sure to press SAVE only once. Look for green labels and the word 'Recall.'

2. Arrow up down or sideways to highlight the memory you want to recall. If the memory is *not* currently used, it will be unchecked and gray, and you can't select it. Otherwise it will be bold and the box will be checked.
3. Press ENTER. A menu showing the details of that stored memory location will open.
4. At the bottom of the menu, Yes should be highlighted. If not, use the RIGHT or LEFT ARROW key to highlight Yes and press ENTER

How to read the Save/Recall menus

By default, the secondary Save and Recall menus show you the memory number, selected source, mode of that source, the wall configuration and the position of this cube in the wall. (If you wrote a custom Name for the memory, this name shows instead of the default name.)

Selected source

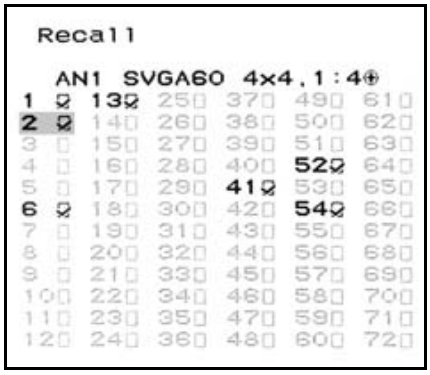
AN1	Analog 1 In
AN2	Analog 2 In
DIG	Digital In
CVD	Composite In
SVD	S-Video In

Mode

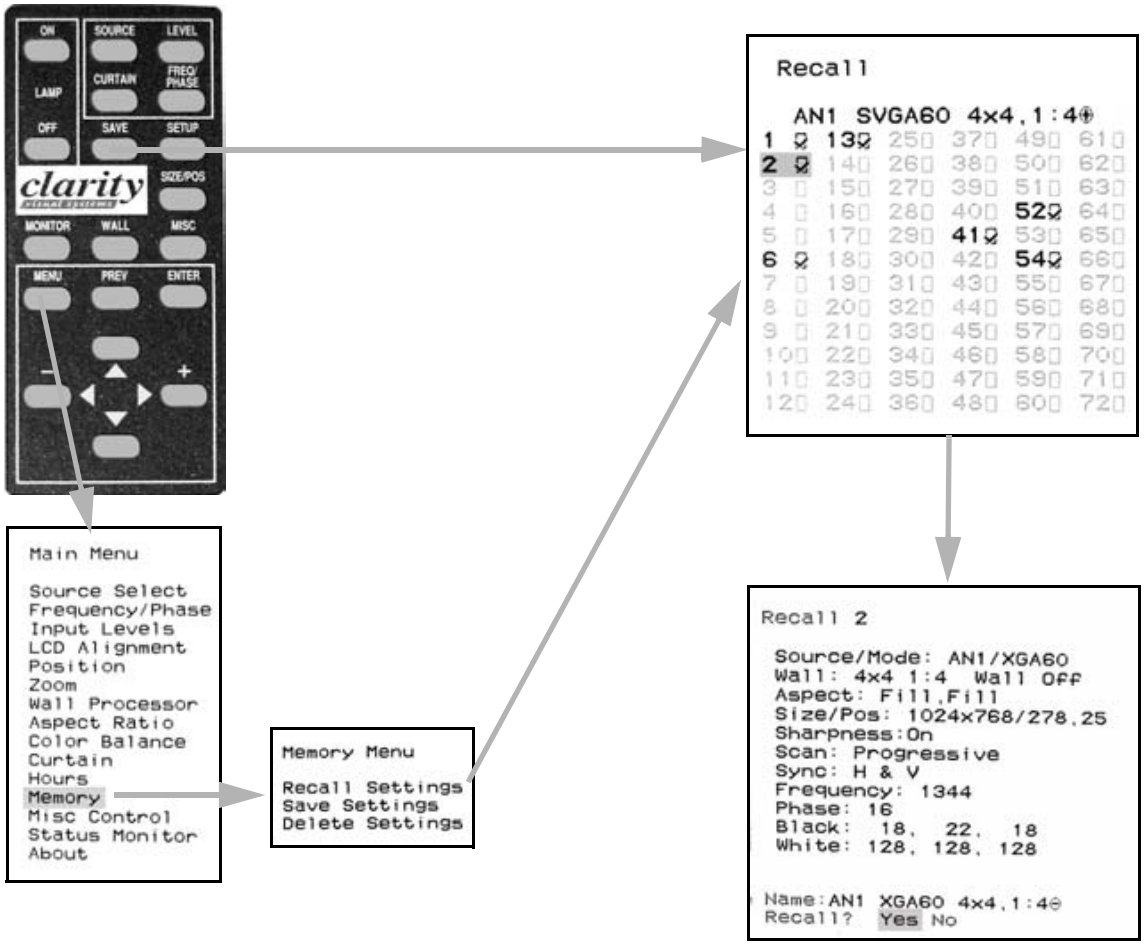
- SVGA = 800 × 600, etc., is the mode for computer sources. The number following this is the refresh rate (vertical frequency).
- NTSC, PAL, SECAM are the modes for video sources.

Wall

4x4	4 high by 4 wide
1:4	Column 1, Row 4
+	Wall Mode is on.



Memory 2 would recall the picture from Analog 1 In, using as the Mode SVGA at 60 Hz. This cube would be in a 4 high by 4 wide wall in Column 1 (first column) in Row 4 (bottom row), and wall mode would be turned on. Memory 2 contains much more, which is shown in the details of this memory be highlighting 2 and pressing ENTER.


ON
SOURCE
LEVEL
LAMP
CURTAIN
FREQ/ PHASE
OFF
SAVE
SETUP
clarity
SIZE/POS
MONITOR
WALL
MISC
MENU
PREV
ENTER
Recall
AN1 SVGA60 4x4,1:4
Main Menu
Source Select
Frequency/Phase
Input Levels
LCD Alignment
Position
Zoom
Wall Processor
Aspect Ratio
Color Balance
Curtain
Hours
Memory
Misc Control
Status Monitor
About
Memory Menu
Recall Settings
Save Settings
Delete Settings
Recall 2
Source/Mode: AN1/XGA60
Wall: 4x4 1:4 Wall Off
Aspect: Fill,Fill
Size/Pos: 1024x768/278,25
Sharpness:On
Scan: Progressive
Sync: H & V
Frequency: 1344
Phase: 16
Black: 18, 22, 18
White: 128, 128, 128
Name:AN1 XGA60 4x4,1:4
Recall? Yes No

4.5.3 Deleting a Saved Memory

Delete is an option provided for convenience only. Overwriting a saved memory accomplishes the same thing.

To delete a saved memory

Delete is not part of the menu chain that occurs when you press SAVE on the remote control. To access Delete you must go through the Main menu.

1. Press MENU on the remote control
2. Highlight Memory and press ENTER.
3. The Memory menu is now open as shown on page 113. Highlight Delete Settings and press ENTER.
4. Arrow up down or sideways to highlight the memory you want to delete. If the memory is not currently used, it will be grayed out and unchecked. Otherwise it will be bold and the box will be checked.
5. Press ENTER.
6. The Delete menu will appear as shown on page 113 with the number of the memory that you want to delete next to the Delete title. Be sure that is the memory you wish to delete, there is no Undo available.
7. At the bottom of the Delete menu are the choices Yes or No. Use the RIGHT or LEFT ARROW to highlight Yes and press ENTER.
8. The memory is now clear and will be unchecked and grayed out in all of the Memory menus.

Main Menu

Source Select
Frequency/Phase
Input Levels
LCD Alignment
Position
Zoom
Wall Processor
Aspect Ratio
Color Balance
Curtain
Hours
Memory
Misc Control
Status Monitor
About

Memory Menu

Recall Settings
Save Settings
Delete Settings

Delete

AN1 XGA60 4x4,1:4Θ

1 ☑	13☑	25☐	37☐	49☐	61☐
2 ☑	14☐	26☐	38☐	50☐	62☐
3 ☐	15☐	27☐	39☐	51☐	63☐
4 ☐	16☐	28☐	40☐	52☑	64☐
5 ☑	17☐	29☐	41☐	53☐	65☐
6 ☑	18☐	30☐	42☐	54☑	66☐
7 ☐	19☐	31☐	43☐	55☐	67☐
8 ☐	20☐	32☐	44☐	56☐	68☐
9 ☐	21☐	33☐	45☐	57☐	69☐
10☐	22☐	34☑	46☐	58☐	70☐
11☐	23☐	35☐	47☐	59☐	71☐
12☐	24☐	36☐	48☐	60☐	72☐

Delete 2

Source/Mode: AN1/XGA60
Wall: 4x4 1:4 Wall Off
Aspect: Fill,Fill
Size/Pos: 1024x768/278,25
Sharpness:On
Scan: Progressive
Sync: H & V
Frequency: 1344
Phase: 16
Black: 18, 22, 18
White: 128, 128, 128

Name:AN1 XGA60 4x4,1:4Θ
Delete? Yes No

4.5.4 Details in Save / Recall / Delete

The Save and Recall menus don't have room for much detail, so the Enter key opens a detailed menu showing everything

The form of the Save/Recall/Delete detail menu depends on the source type. In the Save menu, this shows what you *will* save. In the Recall menu, it shows what *is* saved in the numbered memory. Here is what it all means:

- Save (or Recall): the number of the memory you are about to save into (or recall from)
- Source/Mode:
  - AN1 and AN2 = Analog 1 and 2
  - DIG = Digital
  - CVD = Composite video
  - SVD = S-Video
- Source/Mode:
  - NTSC, PAL or SECAM
  - UXGA, SXGA, XGA, SVGA or VGA followed by the vertical refresh rate in Hz.
  - HD1080 or HD720p for HDTV
- Wall: the settings of the Wall Processor—width × height of wall, column:row of this cube, whether wall mode is on or off
- Aspect: the settings in the Aspect Ratio menu, horizontal, vertical
- Size/Pos: pixel dimensions of the source picture, width × height / horizontal and vertical position of the image. The pixel dimensions when Wall Mode is on are the number of pixels used in this display, not the total number of pixels in the whole picture.
- Sharpness: on or off for video or computer sources
- Brightness: the setting for video sources
- Contrast: the setting for video sources
- Hue: the setting for video sources
- Saturation: the setting for video sources
- Scan: the setting for Analog sources
- Frequency: the setting for Analog sources
- Phase: the setting for Analog sources
- Black: the Black Level setting for Analog sources of R G and B values
- White: the White Level setting for Analog sources of R G and B values
- Name: By default, the name is an abbreviation of the settings, but you can change this to a custom name. See 'Custom naming the memories' on page 108.
- Action: If you are saving and the current memory is empty, this says 'Save?'. If you are saving and the current memory is occupied, this says 'Overwrite?'. If you are recalling, this says 'Recall?'.

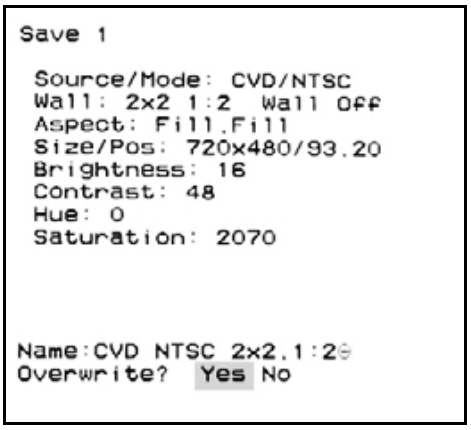
You will understand some of these numbers, such as those for Wall. Other numbers do not carry very much meaning, such as Black Level.

The illustrations on the facing page are for Save. The Recall and Delete menus look the same except for the Save labels.

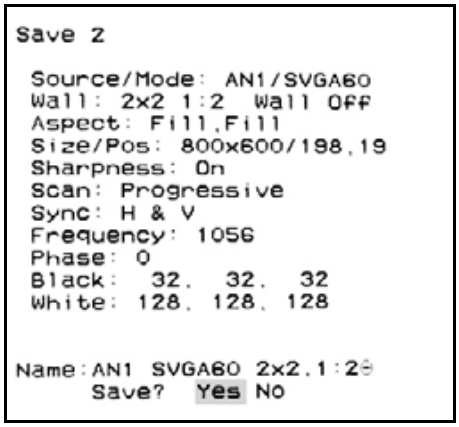
✎ To open the Delete menu, press SAVE twice to open the main Save menu. Then press the left arrow key.

It is not necessary to delete a memory to use it again. Just set up the display and save it to that memory number.

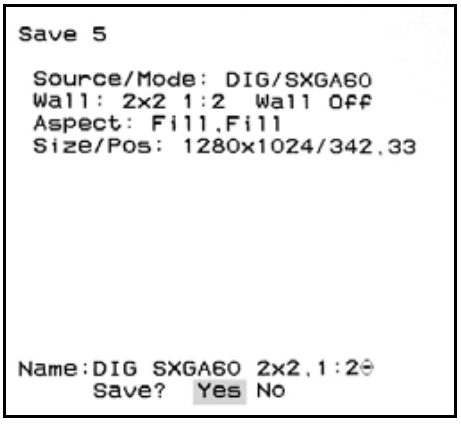
An example of Save for a video source.



An example of Save for an analog computer source.



An example of Save for a digital computer source.



5 Operating the Lion

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5.1 Selecting Sources During Operations

Do not use the Source Select menu to change inputs after you have set everything up. Use Recall instead.

The Source Select menu is a good tool for setup, but it's not a good tool for operations.

If you have several sources coming into the Lion—Analog 1, Analog 2, and S-Video, for instance—use the Source Select menu to initially adjust everything:

- Black and White Levels or Video Controls
- Frequency and Phase
- Saturation and Hue
- Position
- Zoom
- Wall Processor (Big Picture)
- etc.

Then Save the setting for each source in a numbered memory. In the future, and during program operations, **use Recall to change sources**.

For convenience, name the memories as you save, or rename them later. The default name

Why use Recall?

- Auto Detect has to do a lot of work—checking this type of sync, counting lines, counting pixels—and all of this takes time. Recalling a memory is much faster.
- With 72 numbered memories, you can use several of them for one input connector which may have sources of different resolutions at different times during the "show," all coming through an external switcher.

The Source Select menu is a good tool for setup, but it's not a good tool for operations.

5.1.1 Mode Detect: Automatic or Manual?

Mode Detect is a powerful system that automatically sets the display for the type of source you have selected. But automatic systems should sometimes be turned off.

The Mode Detect menu has three items:

- When **Auto** is On, Mode Detect operates continually. At one second intervals the electronics samples the incoming video signal and checks it against the current settings for Mode, Scan, and Sync. If any of these change, the electronics module changes to handle that new signal. When Auto is Off (the default state), you must initiate Mode Detect manually. To do that, highlight Mode Detect in the Source Select menu and press ENTER.
- **Auto Msg** displays a message on the screen just above the Source Select menu that tells you what Mode Detect is doing. When Mode Detect is active, it tests for the presence of sync—H & V, Composite, or Sync on Green. The message displays which of these it is currently testing. It is often useful to have this On during initial setup, but turn it off later.
- **Src Abs Msg**, when On (the default state), shows a **'**Source Absent' message on a black screen whenever there is no source, or when the source has values that are outside the specifications and no image can be displayed. When not checked, if the source is absent, the screen goes to black, but no message is displayed. The color of the screen during Source Absent comes from the Curtain Color menu. See 'Curtain and Its Colors' on page 130.

Should you use Automatic Mode Detect?

With Auto Enable checked, Mode Detect operates continually, constantly checking the incoming signal to see if it deviates from the current settings. This process, particularly when it causes changes in sync, can cause problems.

It is often better to turn Auto Enable off after you have completed setup and saved the settings.

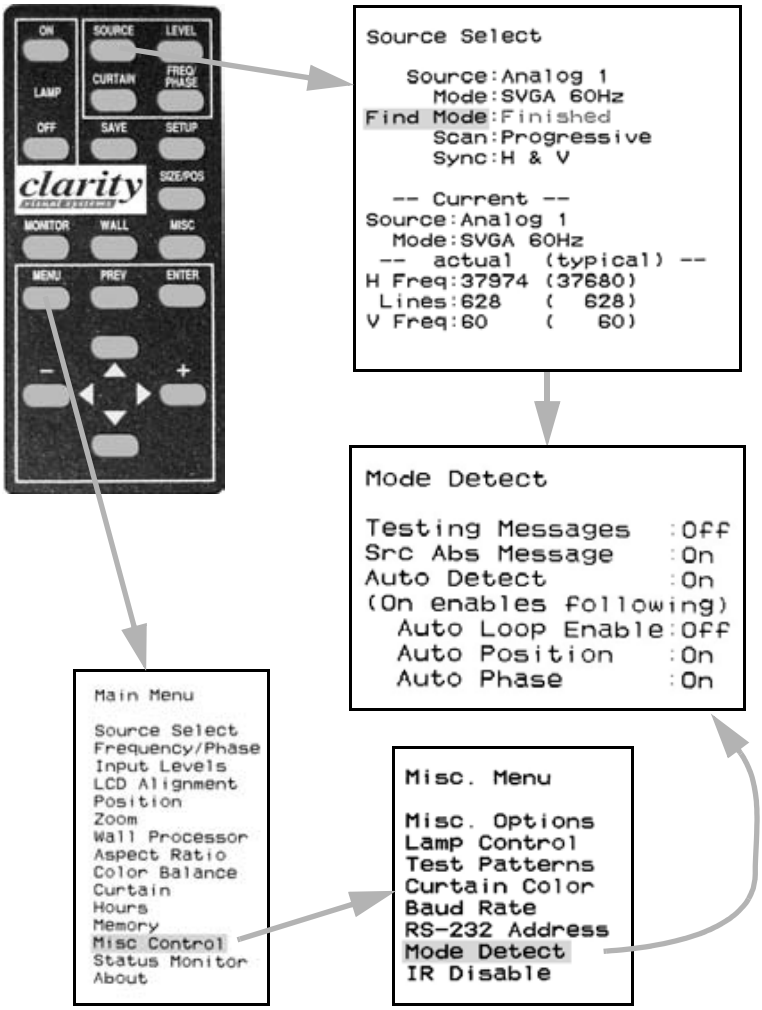
If the installation is not likely to change, automatically detecting the mode can get in the way of a stable picture.

Some people prefer to leave Auto Enable unchecked all the time, then manually initiate Mode Detect from the Source Select menu. As long as they remember to do this, everything will be fine.

Whichever you choose, do *not* manually select the mode for computer sources, that is, do not manually choose the resolution. They different numbers of active lines in the picture. Mode Detect finds and adjusts to all these subtle differences. The chart on the right shows how Mode Detect searches for sync.

Mode Detect works on C-Video and S-Video inputs, too, choosing NTSC, PAL, or SECAM.

After initial setup, it is a good idea to turn Mode Detect off and do all the switching between sources by recalling memories. All the data necessary to display each source properly is stored during in the Save operation. (See 'Selecting Sources During Operations' on page 118, if you have not read it yet.)


ON
SOURCE
LEVEL
LAMP
CURTAIN
FREQ/ PHASE
OFF
SAVE
SETUP
clarity
SIZE/POS
MONITOR
WALL
MISC
MENU
PREV
ENTER
Source Select
Source:Analog 1
Mode:SVGA 60Hz
Find Mode:Finished
Scan:Progressive
Sync:H & V
-- Current --
Source:Analog 1
Mode:SVGA 60Hz
-- actual (typical) --
H Freq:37974 (37680)
Lines:628 (628)
V Freq:60 (60)
Mode Detect
Testing Messages :Off
Src Abs Message :On
Auto Detect :On
(On enables following)
Auto Loop Enable:Off
Auto Position :On
Auto Phase :On
Main Menu
Source Select
Frequency/Phase
Input Levels
LCD Alignment
Position
Zoom
Wall Processor
Aspect Ratio
Color Balance
Curtain
Hours
Memory
Misc Control
Status Monitor
About
Misc. Menu
Misc. Options
Lamp Control
Test Patterns
Curtain Color
Baud Rate
RS-232 Address
Mode Detect
IR Disable

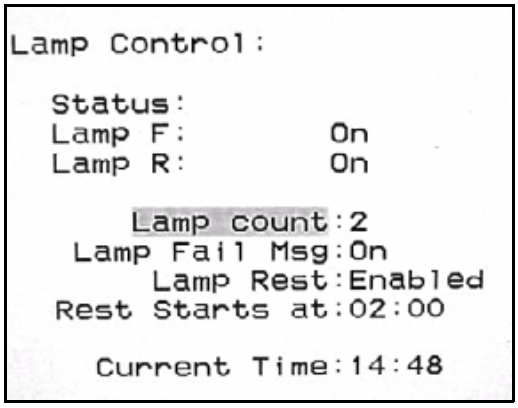
5.2 Lamp Control and Lamp Resting

For longer lamp life, use the Lamp Resting feature.

The lamp manufacturer recommends that the lamps turn off for at least 30 minutes every 24 hours. The Lamp Control menu lets you decide whether and when this will happen.

To cycle the lamps

1. Open the Lamp Control menu: MISC > LAMP CONTROL.
2. Set **Lamp Rest**: Enabled.
3. Set the **Current Time** to the current local time, hours and minutes, then press ENTER.
4. Set **Rest Starts at** to the time you want the cycling to occur, hours only (minutes are always zero).
5. Close all menus.



At the selected time, the lamps will cycle like this:

Lamp Count: 2

before Rest	30 minutes	5	30 minutes	after Rest
Lamp F on	off	on	on	on
Lamp R on	on	on	off	on

Lamp Count: 1

before Rest	5	after Rest
Lamp F off	on	on
Lamp R on	on	off
24 hours later		
Lamp F on	on	off
Lamp R off	on	on

To prevent lamp cycling

1. Open the Lamp Control menu: MISC > MISC.
2. Set **Lamp Rest**: Disabled.
3. Close all menus.

Lamp Count determines whether you will use one lamp or two. If Lamp Count is 1, and Lamp Control is on, when one lamp fails, the other will turn on to provide backup.

Lamp Rest is the feature that cycles the lamps every 24 hours. It is either Enabled are Disabled. (See the *Lamp Count: 2* and *Lamp Count: 1* tables above.)

Rest Starts at sets the hour when lamp resting starts. You can set the hour (24-hour time) only, not the minutes.

Current Time shows the present time. You set this to local time.

1. Open the Lamp Control menu: MISC > MISC.
2. Move the highlight down with the down arrow key until the hour is highlighted.
3. Use the left-right arrow keys to set the time (in 24-hour time). The hour will be red.
4. Press the down arrow to move to the minutes.
5. Use the left-right arrows to set the minutes. The minutes will be red.
6. Press ENTER. The hours and minutes change to black and the clock is set.

If you close this menu before pressing ENTER, the time in *not* set.

✎ When you press ENTER, the seconds (not shown in the menu) are set to zero.

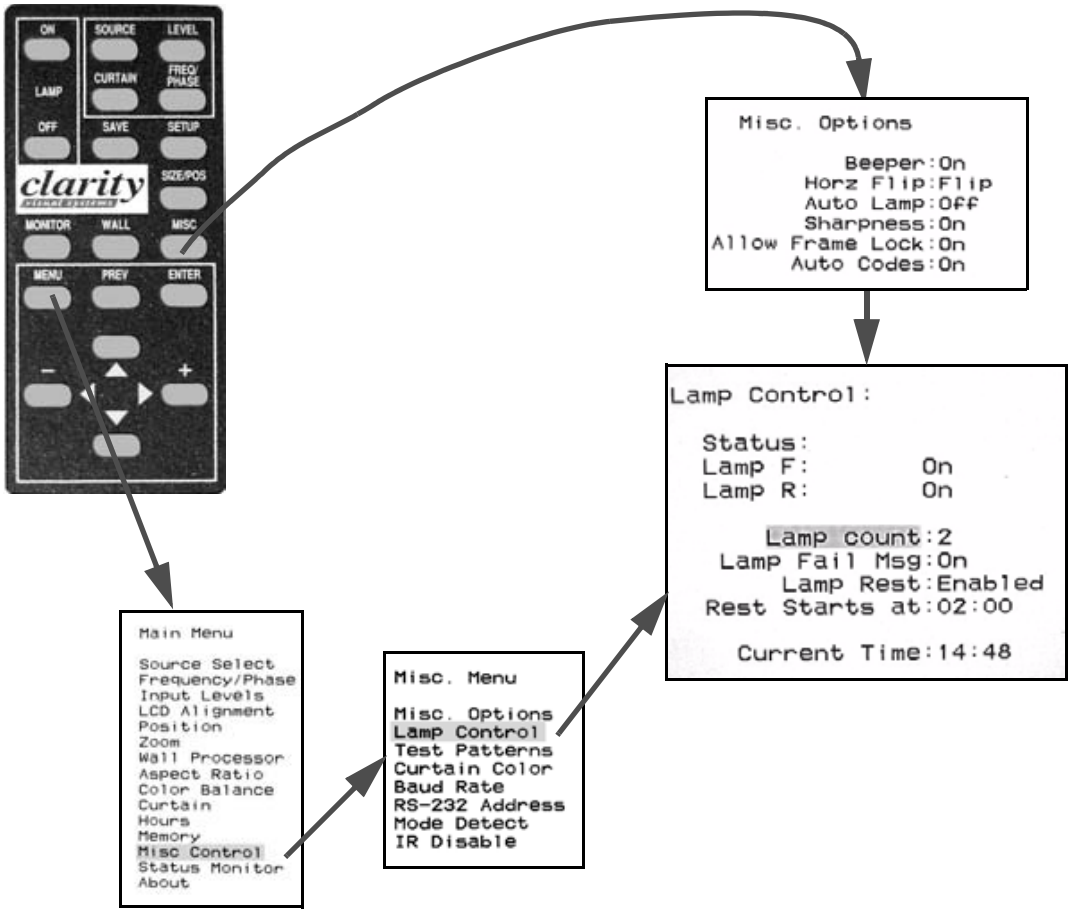
If **Lamp Rest** is *disabled*, lamp resting will not happen.

✎ Lamp resting is not required. It is recommended by the lamp manufacturer. At the time of this writing, there is no hard data comparing lamp life with and without resting.

What if one lamp has failed?

If one of the lamps has already failed when the Rest time comes around, no resting occurs.

If the lamp that was off fails to turn on, the first lamp does not go off.



5.3 Normal Startup Sequence

From AC power on to 'lamps on,' the display follows a strict sequence of events. If a safety interlock is open, the lamps will not turn on.

The normal startup sequence is shown in the diagram.

Lamp Control and Lamp Count

The lamps always ignite, or try to ignite, in this order: Front, Rear. You cannot choose which specific lamp to light.

If Lamp Count is 2, both lamps will try to light. If one will not ignite in fifteen tries, the LED for the bad lamp turns red and the system will not try it again.

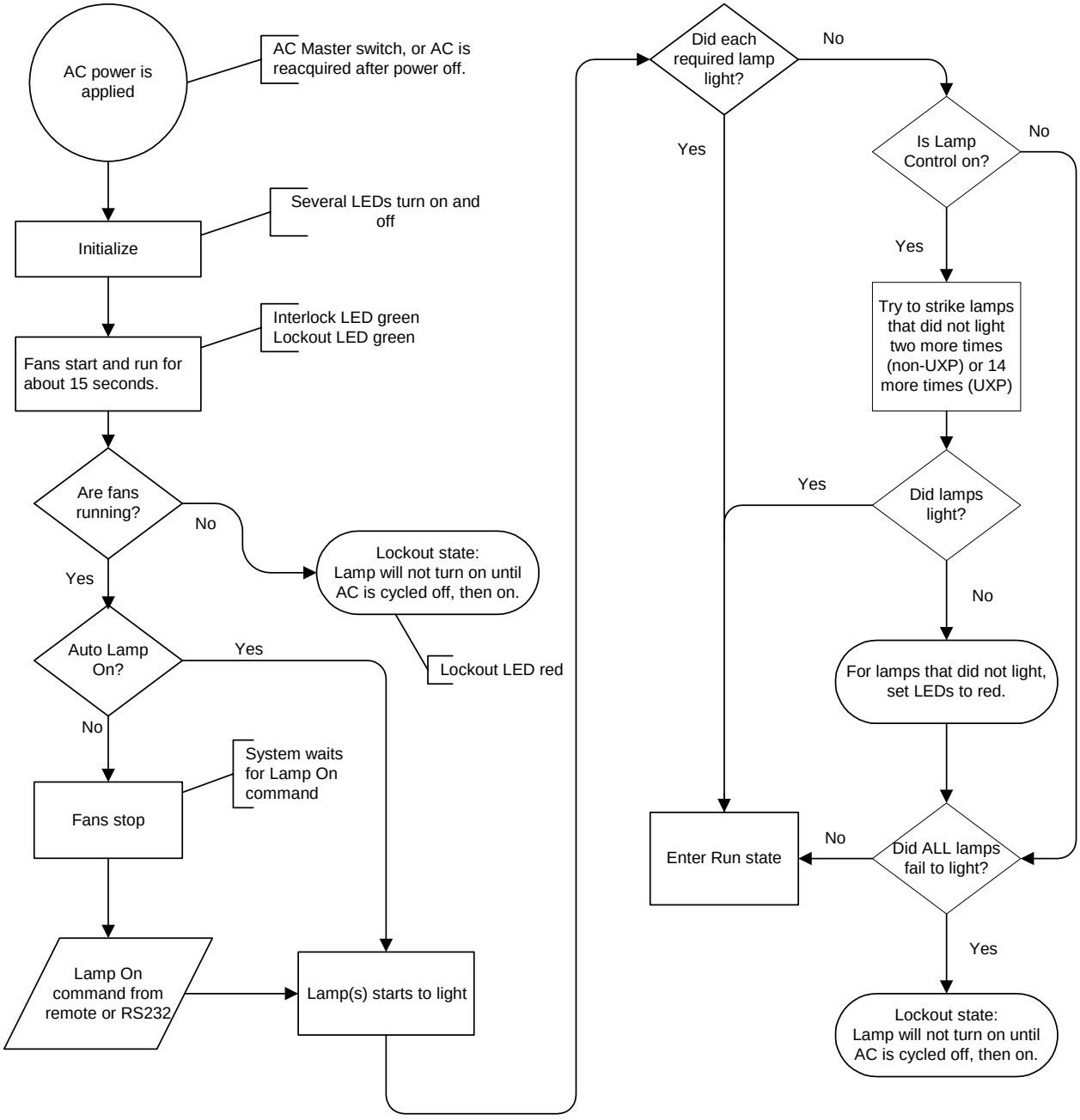
If the Lamp Count is 1, the Lion tries to light the Front lamp. If it will not light after fifteen tries, the Lion tries the Rear lamp.

✎ Do not change the lamp count rapidly up and down. It is possible for the lamp control system to get out of step with reality and not know it.

After the lamps are lit

The system continually monitors the state of the lamps. If any lamp fails the system tries the next lamp in order, if there is one, and turns the failed lamp LED red.

Normal Startup Sequence


AC power is applied
AC Master switch, or AC is reacquired after power off.
Initialize
Several LEDs turn on and off
Fans start and run for about 15 seconds.
Interlock LED green
Lockout LED green
Are fans running?
No
Yes
Lockout state: Lamp will not turn on until AC is cycled off, then on.
Lockout LED red
Auto Lamp On?
Yes
No
Fans stop
System waits for Lamp On command
Lamp On command from remote or RS232
Lamp(s) starts to light
Did each required lamp light?
No
Yes
Is Lamp Control on?
No
Yes
Try to strike lamps that did not light two more times (non-UXP) or 14 more times (UXP)
Did lamps light?
Yes
No
For lamps that did not light, set LEDs to red.
Enter Run state
Did ALL lamps fail to light?
No
Yes
Lockout state: Lamp will not turn on until AC is cycled off, then on.

5.4 The Hours Menu

The Lamp Hours menu helps you keep track of lamp life.

To open the Hours menu:

1. Press MENU on the remote.
2. Highlight Hours and press ENTER.

The Hours menu shows the time in hours and minutes for three groups:

- **System Hours** shows how long the electronics module has received power. This is essentially the number hours the AC power has been on. You cannot reset this. (If the electronics module is replaced, it will start with System Hours near zero.)
- **Runtime Hours** shows how long any lamps have been on, essentially showing how long the optical parts in the light tower and the optical engine have been used. You cannot reset this.
- **Lamp Hours** *should* show how long the lamp has been used. You *can* reset these times.

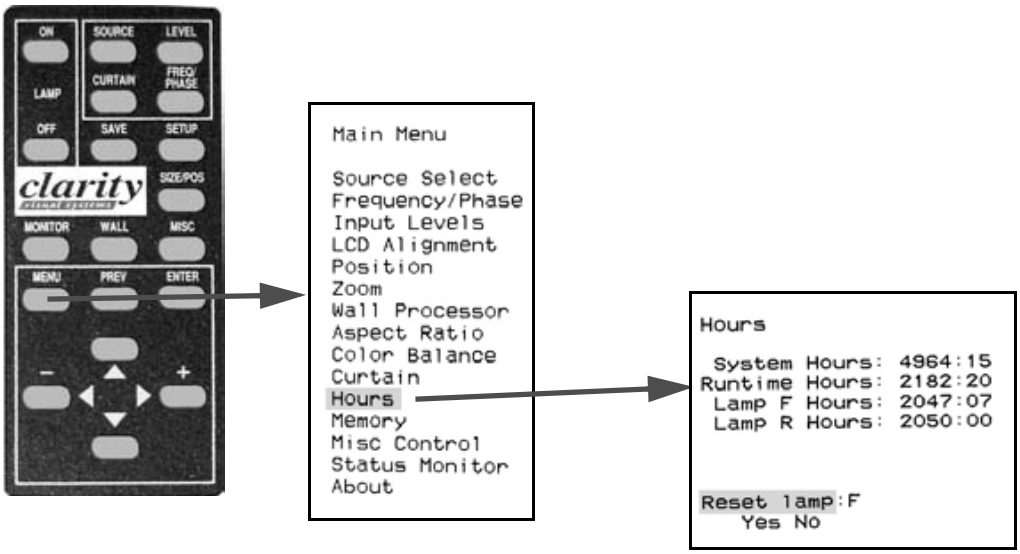
Lamp Hours will only be accurate if you take care to reset the hours when the lamp is changed, and *not* reset hours otherwise.

✎ Lamps are not warranted to last for any particular number of hours. A lamp life of 8000 hours means that half the lamps in a large sample will last at least that long. It does not guaranty that any individual lamp will last that long.

Resetting Lamp Hours

1. Open the Hours menu. ‘Reset lamp’ is highlighted.
2. Press ENTER to move the highlight to No.
3. Press the – (left) arrow key to highlight Yes.
4. Press ENTER.

✎ There is no ‘undo’ for Lamp Hours.


ON
SOURCE
LEVEL
LAMP
CURTAIN
FREQ/ PHASE
OFF
SAVE
SETUP
clarity
SIZE/POS
MONITOR
WALL
MISC
MENU
PREV
ENTER
Main Menu
Source Select
Frequency/Phase
Input Levels
LCD Alignment
Position
Zoom
Wall Processor
Aspect Ratio
Color Balance
Curtain
Hours
Memory
Misc Control
Status Monitor
About
Hours
System Hours: 4964:15
Runtime Hours: 2182:20
Lamp F Hours: 2047:07
Lamp R Hours: 2050:00
Reset lamp:F
Yes No

5.5 Setting Some Default Conditions

Here are the settings you can change to suit your application.

Press MISC once to open the **Misc Options** menu. To change any item, highlight it and press ENTER.

Beeper: When this is on, the system beeps every time a button is pressed, and beeps continually when a button is held down. When Off, the system still beeps for these conditions:

- Lamp On command from the remote
- Lamp Off command from the remote
- See also **Triple beep** on page 129.

Horz Flip reverses the image left and right when you press ENTER. It is usually set to Norm, but you can change it to Flip if you need to.

Sharpness is normally On for analog sources. It is grayed out for digital video sources where it would have no effect. When Sharpness is off, the picture goes through a low pass filter.

Auto Lamp, when on starts to strike the lamps very soon after AC power is acquired, without waiting for a Lamp On command. If AC power is lost, the lamps are ignited soon after it power is restored. (The system takes about 15 seconds to initialize after AC power on.) If Auto Lamp is Off, the system waits for a command from the remote or from RS232 before igniting the lamps.

Allow Frame Lock is normally set to Yes.

Unlike CRT monitors, an LCD monitor has a specific output frequency at which it always operatest. In Lion, incoming video is collected in a frame buffer at the input rate and fed to the LCD at the output rate. Because these two rates are not the same, sometimes a frame of video may be dropped in order to keep pace with the output. This will cause a jerk in video scenes with motion. Depending on the relative speed of the input and output, these jerks may be as seldom as twice a minute or much more frequent.

When the input frequency is similar to the output frequency, Lion synchronizes the two clocks to avoid this frame drop. This is called Frame Lock, which is on in all modes with a vertical frequency of 60 Hz. When the system is frame locked, it is dependent on having a stable input vertical frequency in order to work.

If that vertical timing is not there, there will be no picture, including no menus. So, for safety, frame lock mode is not turned on if menus are open or if there is no input.

Although very rare, it is possible that a marginal input could cause the system to not lock to the video. If this were to happen, you would see a picture when the menu is open, but not see it when the menu is closed.

The override in the Misc Options menu which will force frame lock to not turn on. This override is saved in numbered memories.

Allow Frame Lock should normally be Yes, but if the symptom above described occurs, set it to No.

Auto Codes is described in **'About Auto Codes' on page 132**.

Other menus on the Misc button

Lamp Control is discussed in 'Lamp Control and Lamp Resting' on page 122.

Test Patterns are discussed in 'Test Patterns' on page 134.

Curtain Color is described in 'Curtain and Its Colors' on page 130.

Baud Rate in kilobytes per second, is the data rate that the RS232 Input and Output ports use. The correct rate, matching the computer's rate, must be set in each display manually with this menu. The RS232 port does not automatically detect the incoming rate, as modems often do. See 'Controlling the Displays with RS232' on page 138 for more information.

✎ The rate set in this menu does not effect the baud rates for the Trace and Load Data connectors. These are always 115.2 Kbps.

Address Select sets the RS232 address of this display cube. This is the only place where you can set the RS232 address. If you do not use RS232 control, this address does not matter. If you do use RS232, see 'Controlling the Displays with RS232' on page 138 and 'Sending RS232 Commands' on page 140 for a complete description of the system and its protocol.

IR Disable

Press MISC seven times to open the IR Disable menu. If you select Yes and press ENTER, the menu

```
IR Disable

Disable IR?  Yes No
```

disappears and almost all remote control buttons are disabled. This is useful to prevent accidental changes to the settings. The Lamp Off button will still turn off the lamps in this condition, and when they are turned back on, IR is not disabled.

To enable IR control again without having to turn off and on the lamps, press ENTER. The IR Disable menu opens with the highlight on No. All remote buttons now operate normally.

✎ When IR Disable is initiated with RS232 commands, the only remote button that works is Lamp Off. ENTER will not enable the remote the rest of the remote.

Triple beep

The Lion will triple beep if you try to give it a command from the remote control that it cannot do. For instance, pressing MENU with the lamps off will produce a triple beep. Some of the triple-beep signals will happen even when the Beeper is off.

```
Main Menu

Source Select
Frequency/Phase
Input Levels
LCD Alignment
Position
Zoom
Wall Processor
Aspect Ratio
Color Balance
Curtain
Hours
Memory
Misc Control
Status Monitor
About
```

```
Misc. Menu

Misc. Options
Lamp Control
Test Patterns
Curtain Color
Baud Rate
RS-232 Address
Mode Detect
IR Disable
```

```
  Misc. Options

         Beeper:Off
      Horz Flip:Norm
      Auto Lamp:On
      Sharpness:On
Allow Frame Lock:On
      Auto Codes:On
Invert Odd/Even: On
```

```
Curtain Colors

          User:Red
  Src Absent:Green
Auto Detect:Blue
```

```
Baud Rate

  9.6Kbps
 •19.2Kbps
  38.4Kbps
  57.6Kbps
  115.2Kbps
```

```
Lamp Control:

  Status:
  Lamp F:        On
  Lamp R:        On

     Lamp count:2
  Lamp Fail Msg:On
     Lamp Rest:Enabled
  Rest Starts at:02:00

    Current Time:14:48
```

```
Address Select

RS-232:
   Group:4 (04)
    Unit:B (11)
```

```
Test Patterns

 •None
  White
  Black
  50% Gray
  Red
  Green
  Blue
  Alignment
  Geometry
  Gray Scale
```

```
Mode Detect

Testing Messages   :Off
Src Abs Message    :On
Auto Detect        :On
(On enables following)
  Auto Loop Enable:Off
  Auto Position    :On
  Auto Phase       :On
```

```
IR Disable

Disable IR?  Yes No
```

5.5.1 Curtain and Its Colors

Curtain, when on, blocks the source picture and displays instead a solid color on the screen. There are three conditions under which this might occur.

Curtain is a control that covers (blocks) the incoming picture with either black or a selected color. Curtain is active (on) under these conditions:

- **User**: when you manually turn Curtain on with the Curtain button or through the main menu;
- **Src Absent**: when there is no picture from the selected source (Source Absent), or when this picture is invalid (which is also considered to be Source Absent);
- **Auto Detect**: while the system is trying to acquire the incoming picture, searching for its type of sync.

In each of these situations, the Lion covers the screen with black or with a color you choose: red, green, blue, black or white.

The User color is also used as the background for Aspect Ratio. When the Image Fit is *not* set to fill-fill, part of the screen is filled with the User color.

If a source is present and the curtain is on, a "Curtain On" message will appear for about 2 seconds above the menu whenever a menu is opened. This is to help avoid confusion as to why the screen is black when a source is present.

To set Curtain colors

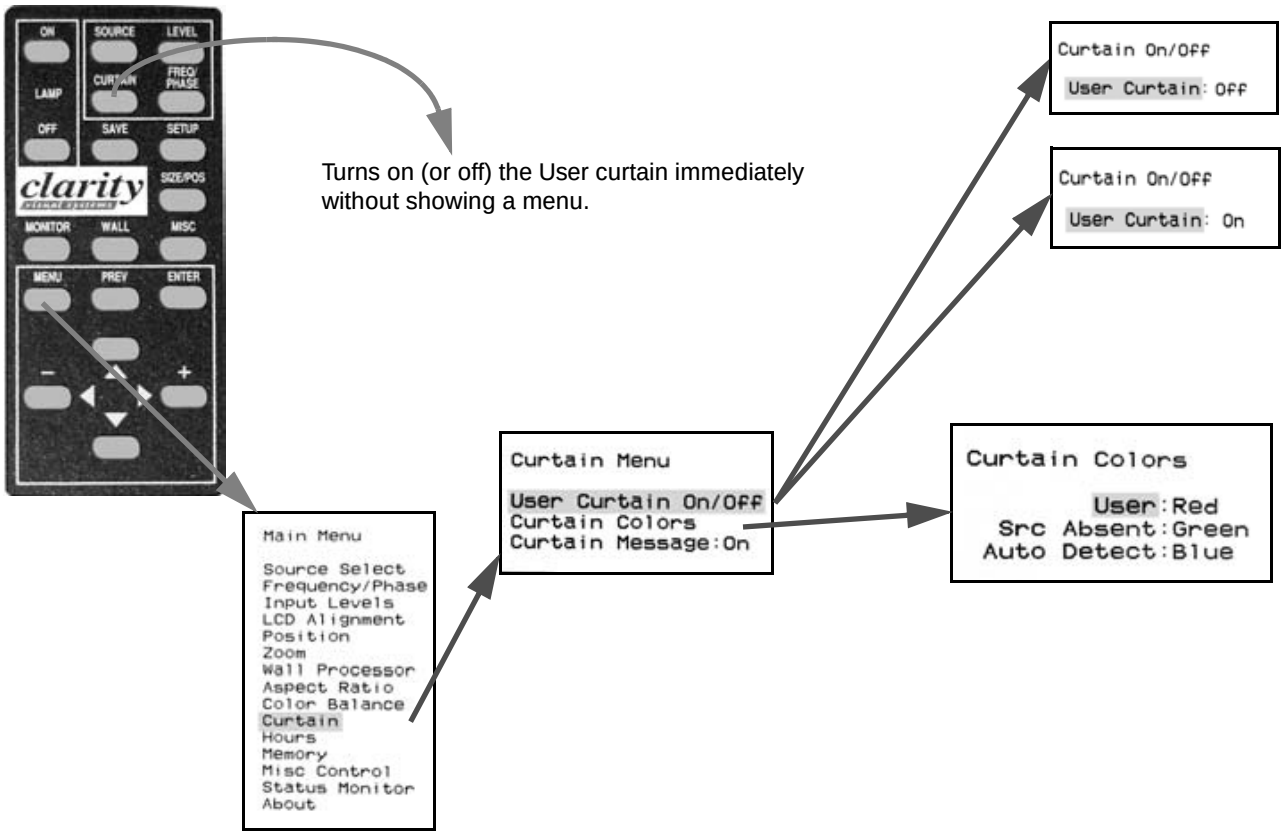
1. Press MENU.
2. Highlight Curtain and press ENTER.
3. Highlight Curtain Colors and press ENTER.
4. Select the condition and press ENTER.
5. Select the color.
6. Press PREV to return to back up and select another condition, or press PREV several times to back out of the all menus.

✎ You can't go to these menus with the Curtain fast key. That button simply turns the curtain on and off.

For most applications, the screen should be black under each of these conditions, and this is the default setting. However, you may set them differently so you will know what the Lion was doing.

Test Patterns

Test patterns constitute a fourth type of curtain. When you turn on a test pattern, the incoming video is blocked, just as it is with the three types of curtain described above.


ON
SOURCE
LEVEL
LAMP
CURTAIN
FREQ/ PHASE
OFF
SAVE
SETUP
clarity
SIZE/POS
MONITOR
WALL
MISC
MENU
PREV
ENTER
Turns on (or off) the User curtain immediately without showing a menu.
Curtain On/Off
User Curtain: Off
Curtain On/Off
User Curtain: On
Main Menu
Source Select
Frequency/Phase
Input Levels
LCD Alignment
Position
Zoom
Wall Processor
Aspect Ratio
Color Balance
Curtain
Hours
Memory
Misc Control
Status Monitor
About
Curtain Menu
User Curtain On/Off
Curtain Colors
Curtain Message:On
Curtain Colors
User:Red
Src Absent:Green
Auto Detect:Blue

5.5.2 About Auto Codes

Auto Codes in the Misc Options menu turns on the On-Screen Status Code whenever there is a fault, whether this fault turns off the lamps or not.

When a fault occurs in the Lion, do you want to see a code on the screen telling you what the fault is? Or will such information interrupt the program material and be a distraction?

Auto Codes on

When Auto Codes is on, any fault that turns off the lamps will immediately display this blinking code on the screen. It appears as an out-of-focus red or amber light on the screen, blinking as shown in the table.

To turn off this code, once it has automatically started, press MONITOR on the remote.

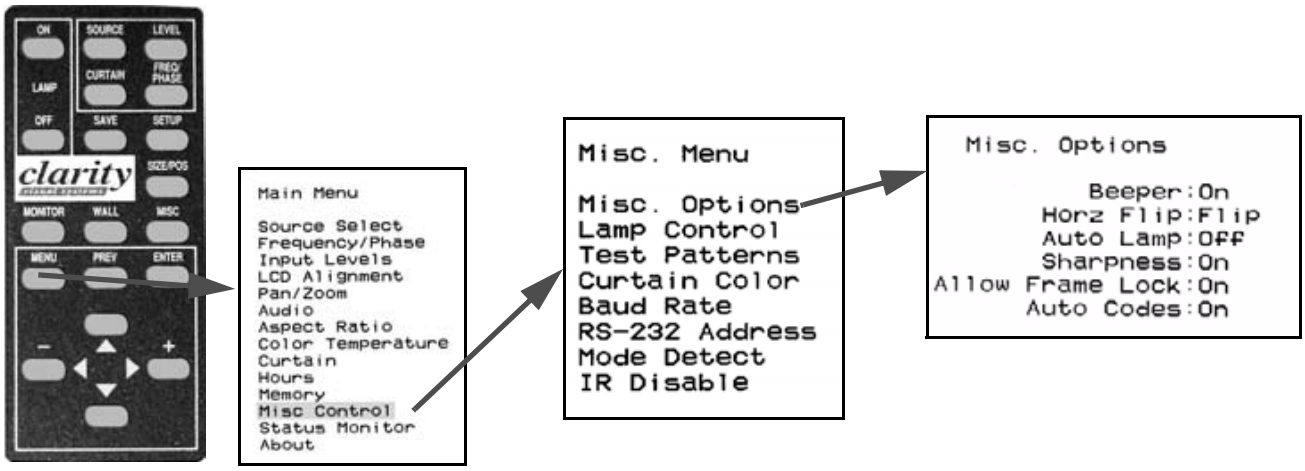
Auto Codes off

When Auto Codes is off, you can still use them, but they will not appear automatically. Press MONITOR to see the code; press it again to turn the codes off. If a lamp is on when you press MONITOR, the Cube Status menu will also appear. Pressing MONITOR again steps through the status menus. (See 'Reading the Status Menus' on page 24 for complete explanation of these menus.)

Which to choose: Auto Codes on or off?

In some installations, such as a wall used for customer messages or advertising, a coded message on the screen may be out of place.

In other installations, such as data displays for command and control, it might be helpful to know immediately if one of the lamps failed.



Lion UXP On-Screen Diagnostic Codes

	Condition	Priority	Each block represents 0.2 seconds
Starts with Red Lamps turn off.	Lamp Bay door open	1	R R R
	Any Fan stopped	2	R Amber
	350 V missing	3	R R Amber
	Sensor overtemp, lamps off [1]	4	R Amber R
	Lockout [2]	5	R R R R
Starts with Amber. Lamps stay on.	Sensor overtemp, lamps not off [3]	6	Amber R R
	Lamp failure, either lamp	7	Amber R Amber
	Sensor approached limit	8	Amber R
	Standby state [4]	9	Amber Amber
	Lamps on, no alarms	10	Amber on continuously

R = Red

[1] Sensor over limit and Temp Monitor is On.

[2] Conditions 1, 2, 3, or 4 will cause Lockout. After fixing the problem, you may see Condition 5, Lockout. You must cycle AC power off, then on, to reset the Lockout condition.

[3] Sensor over limit and Temp Monitor is Off.

[4] Waiting for a Lamp On command.

5.6 Test Patterns

The Test Patterns available in the menus are internal patterns. They cannot be used for Black and White Level adjustments or Frequency and Phase.

To display a test pattern

Press MISC to open the Test Pattern menu. To change patterns, move the highlight up or down with the arrow keys. Then press ENTER. The pattern does not appear until you press ENTER.

While a test pattern is on, press PREV to turn off the menu and the pattern will remain. (With the Alignment and Geometry patterns, you cannot turn off the menu.)

Test patterns are internally generated. When you turn on a test pattern, you block the selected source picture. To show the picture again, you have to turn off the test patterns

Using Test Patterns

None means no test pattern is used and the source picture is displayed.

White is used for color balancing. You can turn on White from the Color Balance menu. White can also be used to look for pixels that are stuck off.

Black is used to look for pixels that are stuck on and to check for light block issues, such as a strong overhead source of light sending between the main chassis and the screen.

50% Gray is also used for color balancing, and you can turn it on from the Color Balance menu.

Red, Green, and Blue can be used to look for stuck pixels.

Alignment is used to adjust the position and size of the LCD's image. This pattern has a series of short dashes all around the edge of the picture. The dashes indicate the outside four pixels on each edge.

Geometry is used to adjust the position and size of the LCD's image. When you highlight Geometry and press ENTER, the screen may start with random pixels. Then a 4×4 grid is painted from the top down. The lines in the interior are one pixel wide, and the outside edges are three pixels wide.

Gray Scale tests for missing bits in the LCD. You should see a relatively smooth transition from black to white.

About Alignment and Geometry patterns

The Alignment and Geometry test patterns, which are the same as Alignment Dashes and Geometry Pattern in the LCD Alignment menu, take several seconds to display. They must be drawn eight pixels at a time. Sometimes the screen will also have random pixels, but you will always be able to see the pattern.

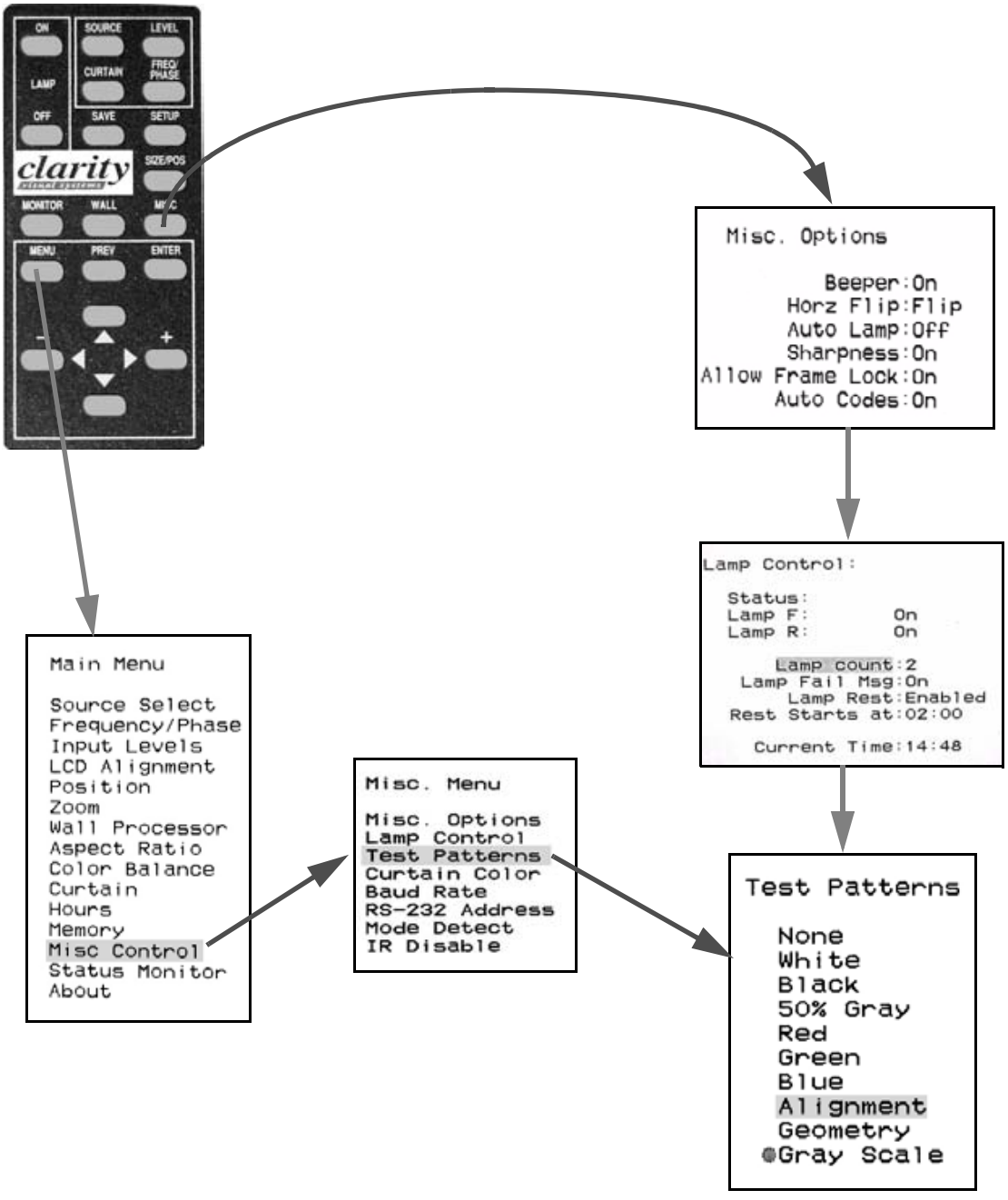
In the Alignment pattern you may see only three dashes on the left side of the screen, no matter how where the LCD is horizontally. If this happens, highlight Alignment in the Test Patterns menu and press the + or – a few times to make all four dashes appear.

If the left side border in the Geometry Pattern is only two pixels wide, highlight Geometry Pattern and press the + or – buttons to fix it.

✎ Be sure to set Test Patterns to None when you are finished with them. Otherwise, no source pictures can be displayed.

To turn off a test pattern

1. Press MISC to open the Test Pattern menu.
2. Use the up or down arrow to move the highlight to None.
3. Press ENTER. This turns off the test patterns and displays the selected source picture on the screen.


ON
SOURCE
LEVEL
LAMP
CURTAIN
FREQ/ PHASE
OFF
SAVE
SETUP
clarity
SIZE/POS
MONITOR
WALL
MY C
MENU
PREV
ENTER
Misc. Options
Beeper:On
Horz Flip:Flip
Auto Lamp:Off
Sharpness:On
Allow Frame Lock:On
Auto Codes:On
Lamp Control:
Status:
Lamp F: On
Lamp R: On
Lamp count:2
Lamp Fail Msg:On
Lamp Rest:Enabled
Rest Starts at:02:00
Current Time:14:48
Main Menu
Source Select
Frequency/Phase
Input Levels
LCD Alignment
Position
Zoom
Wall Processor
Aspect Ratio
Color Balance
Curtain
Hours
Memory
Misc Control
Status Monitor
About
Misc. Menu
Misc. Options
Lamp Control
Test Patterns
Curtain Color
Baud Rate
RS-232 Address
Mode Detect
IR Disable
Test Patterns
None
White
Black
50% Gray
Red
Green
Blue
Alignment
Geometry
Gray Scale

6 Controlling the Lion with RS232

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6.1 Controlling the Displays with RS232

Lions can be controlled individually or in groups with RS232 commands. Each display must have a unique address. Each cube and the command computer must have the same baud rate setting. Baud rate setting is not automatic, as it is in modems.

To control lots of displays with RS232 commands, each display must have a unique RS232 address. The cube's address consists of two hexadecimal numbers:

- first digit: Group
- second digit: Unit

These two digits together make one address. There are 256 unique addresses possible.

To set the baud rate

1. On the remote, press MISC five times. This opens the Baud Rate menu.
2. Highlight the baud rate that the computer uses at its Comm Port and press ENTER.

✎ The baud rate of the computer and the display must be the same. The display does not automatically detect the baud rate, as most modems do.

To set the address of a cube

1. Press MISC one more time (or press it six times, if you are start with no menus on the screen). This opens the Address Select menu.
2. Highlight Group, and use the left/right arrow keys to change the Group Address. Range: 0–15, which is 0–f in hexadecimal notation.
3. Highlight Unit and choose Unit Address for this cube.

✎ The addresses are shown in both hex (0–9, a–f) and decimal (00–15). When sending commands to cubes with RS232, you always use the hex form of the address.

4. Press MISC one more time to close the menu.

✎ One thing you cannot do is change a cube's address with RS232 commands. You can't send a command to cube 17 telling it to have address 18. You can change addresses only with the remote control.

What address to use

You may address the cubes with any addressing scheme you choose, but here are some things to keep in mind:

- You can send a single command to all the cubes that have the same first digit. Example: You might have two video walls, one with 0 as the first number in the address, and one with 1 as the first number. This is called **group addressing**.
- You can send a single command to all the cubes that have the same last digit. Example: You can address all the cubes that have 3 as the second digit. This is called **unit addressing**.
- You can send a single command to all the cubes in all the walls. This is called **global addressing**.
- You can send a command to one cube alone. This is called **single addressing**.

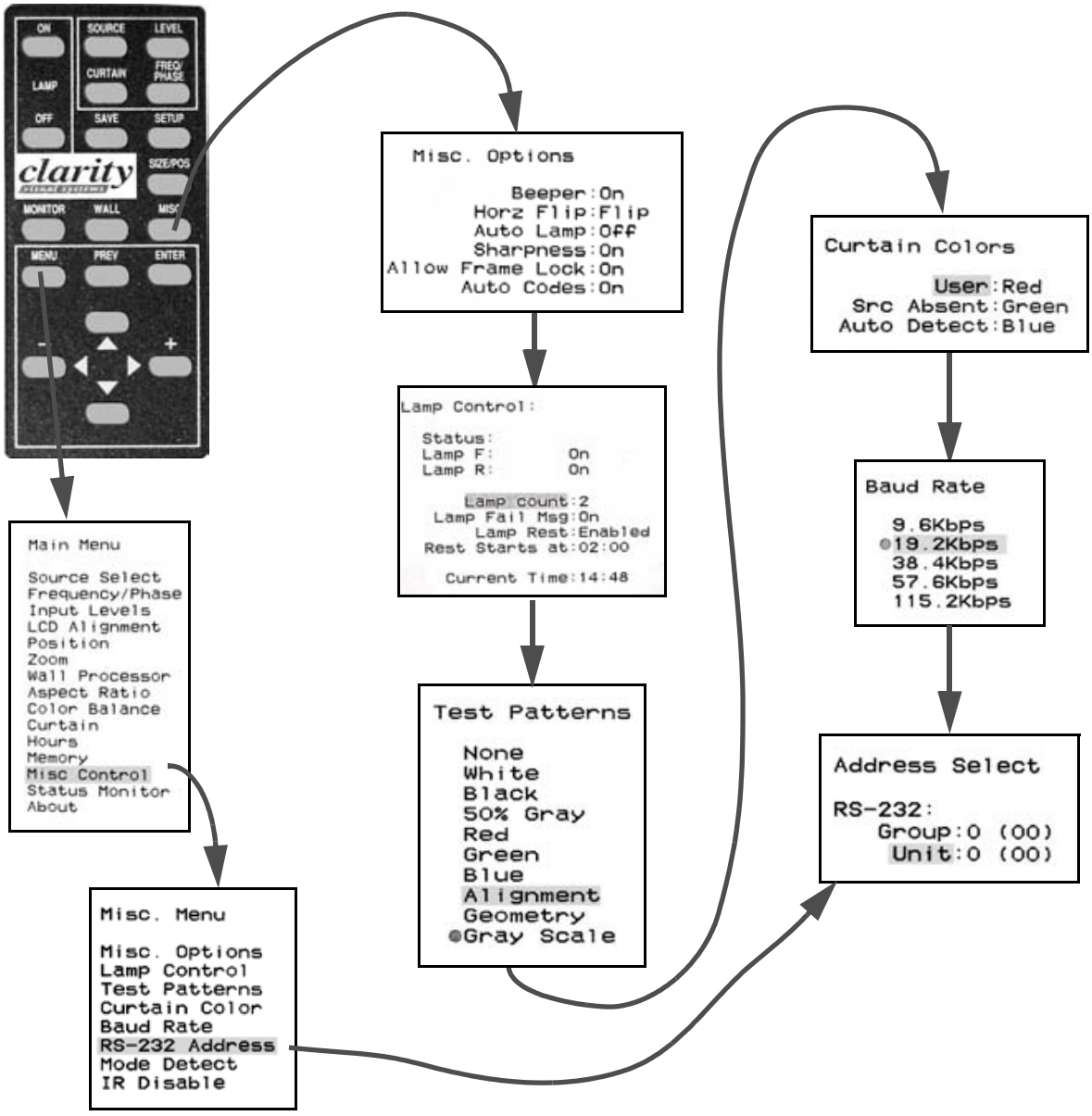
Typical addressing schemes

If you want to control cubes is groups, give each group a unique first number.: 11, 12, 13, etc. There is no rule that says you must number the cubes for their location in a wall. Here is a physical wall that will be controlled in four separate sections and as a whole wall:

11	12	21	22
13	14	23	24
31	32	41	42
33	34	43	44

In this scheme, each of the four smaller 2 × 2 groups can be controlled with group addressing: 1* addresses all four cubes in the upper left quadrant. And all the cubes can be controlled together with ** commands.

How you construct commands to address cubes in these different ways is explained in the next section.


ON
SOURCE
LEVEL
LAMP
CURTAIN
FREQ/ PHASE
OFF
SAVE
SETUP
clarity
SIZE/POS
MONITOR
WALL
MISC
MENU
PREV
ENTER
-
+
Main Menu
Source Select
Frequency/Phase
Input Levels
LCD Alignment
Position
Zoom
Wall Processor
Aspect Ratio
Color Balance
Curtain
Hours
Memory
Misc Control
Status Monitor
About
Misc. Menu
Misc. Options
Lamp Control
Test Patterns
Curtain Color
Baud Rate
RS-232 Address
Mode Detect
IR Disable
Misc. Options
Beeper:On
Horz Flip:Flip
Auto Lamp:Off
Sharpness:On
Allow Frame Lock:On
Auto Codes:On
Lamp Control:
Status:
Lamp F: On
Lamp R: On
Lamp count:2
Lamp Fail Msg:On
Lamp Rest:Enabled
Rest Starts at:02:00
Current Time:14:48
Test Patterns
None
White
Black
50% Gray
Red
Green
Blue
Alignment
Geometry
Gray Scale
Curtain Colors
User:Red
Src Absent:Green
Auto Detect:Blue
Baud Rate
9.6Kbps
19.2Kbps
38.4Kbps
57.6Kbps
115.2Kbps
Address Select
RS-232:
Group:0 (00)
Unit:0 (00)

6.2 Sending RS232 Commands

RS232 commands must have the specific form described here. The baud rate of the computer must match the rate of the display.

Every command must start and end with special characters.

- **Start** character: hex 02, which sometimes it prints as the ☺ character.
- **End** character: hex 03, which sometimes prints as the ♥ character.

Between the start and end of an RS232 command, there are two parts:

- **Address**: 2 bytes, 00 through FF, hex numbers, which equal 0 to 255 decimal.
- **Command**: 3 bytes, text and binary numbers, listed in the RS232 Command List.

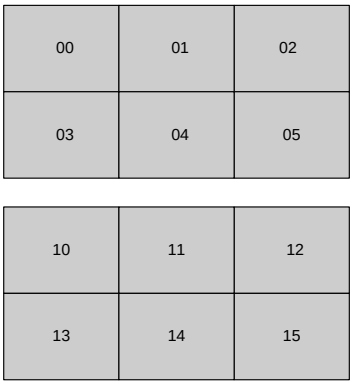
Four types of addresses

The address of each cube is set in the Misc Control menu. Each cube in a system *must* have a different address.

Normally, all cubes in a system are looped together for RS232 control, so several separate video walls may be joined in a single, long, RS232 loop. In such an arrangement, cubes can be addressed singly, in small groups, or they can all be addressed together.

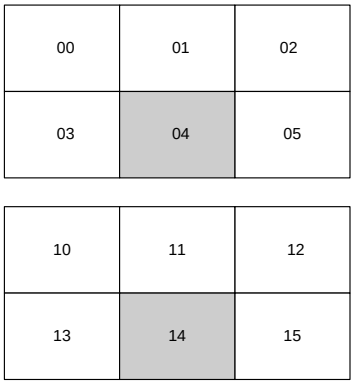
In the following illustrations, all 12 cubes are strung together in one RS232 loop, so they can all 'hear' the same commands.

When the command uses a **global address**, all the cubes obey the command, regardless of their addresses. In the command $02**PON$03 ($ indicates that what follows is in hex), all cubes in both video walls turn on their lamps. A '*' is a wild-card and means 'any.' (PON is the command to turn on the lamps.)



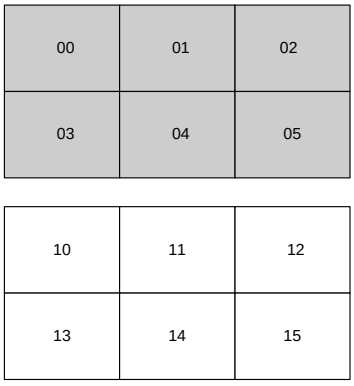
Global address: **

In **unit address**, all cubes with the same *last* digit obey the command. The first digit is a wildcard. In the command $02*4PON$03, all cubes with an address ending in 4 turn on their lamps.



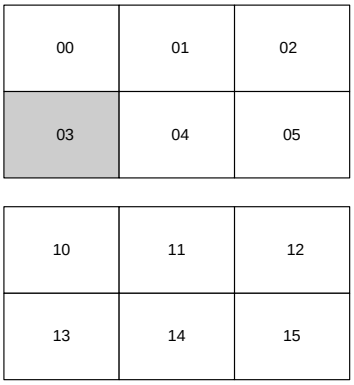
Unit address: *4

In **group address**, all cubes with the same *first* digit obey the command. In the command $020*PON$03, all the cubes with an address starting in 0 turn on their lamps.



Group address: 0*

In **single address**, only one cube responds to the command. Here, the command is ☺03PON♥. Only cube 03 turns on its lamps.



Single address: 03

In single address, and *only in single address*, the cube responds to the computer, acknowledging the command.

Acknowledging commands

A cube acknowledges a command *only* if the command is addressed to it individually—no '*' in the address. The acknowledgment can take several forms:

- ACK means 'I heard the command and I will attempt to execute it.' It will try to turn on the lamps, for instance, but it may not be successful. Maybe there are no lamps in the cube to turn on.
- NAK means 'I heard the command, but I can't do it.' The cube can't turn on the lamps during the Lockout Period.
- UNK means 'This command is unknown to me.' POJ doesn't mean anything to the cube.
- ERR means 'This command has an error in it.' This often means the binary number in the command is out of range.
- If the command asks for a value, such as BR$, meaning 'What is your White Color Balance adjustment level for Red?' the cube will also respond with a value, either a binary number or an ascii character, as appropriate.

How to send commands

Each serial communications system has its own way of sending hex values. In AnyComm, a Shareware program available on Clarity's website, the dollar sign indicates that a hex value follows. So,

$02$30$34$$57$58$03$03

which means:

- $02 – the start character
- $30$34 – the cube with address 04
- $57$58$03 – the hex values for the characters WX and the hex value of 3 to set this cube's wall width to 3 cubes wide. (All RS232 commands use upper case letters, never lower case.)
- $03 – the end character

Other communications systems use different ways to indicate hex values.

- \x (backslash x)
- 0x (zero x)

Check with the instructions for the system you are using.

6.3 Check List for RS232 Control

__ Each cube has a unique RS232 address, including all cubes in all walls in this RS232 loop-thru

__ Addresses are logically assigned for addressing cubes in groups

__ All cubes connected with RJ-45 cable

__ Baud rate set on all cubes

__ Baud rate of controlling device same as cubes

__ Sending PNG command to each cube separately produces a response

Table of ASCII Hex Values

Dec	Hex	Char		Dec	Hex	Char		Dec	Hex	Char		Dec	Hex	Char
0	00			32	20	Space		64	40	@		96	60	`
1	01			33	21	!		65	41	**A**		97	61	a
2	02	start		34	22	"		66	42	**B**		98	62	b
3	03	end		35	23	#		67	43	**C**		99	63	c
4	04			36	24	$		68	44	**D**		100	64	d
5	05			37	25	%		69	45	**E**		101	65	e
6	06			38	26	&		70	46	**F**		102	66	f
7	07			39	27	'		71	47	**G**		103	67	g
8	8			40	28	(		72	48	**H**		104	68	h
9	9			41	29	)		73	49	**I**		105	69	i
10	0A			42	2A	*		74	4A	**J**		106	6A	j
11	0B			43	2B	+		75	4B	**K**		107	6B	k
12	0C			44	2C	,		76	4C	**L**		108	6C	l
13	0D			45	2D	-		77	4D	**M**		109	6D	m
14	0E			46	2E	.		78	4E	**N**		110	6E	n
15	0F			47	2F	/		79	4F	**O**		111	6F	o
16	10			48	30	0		80	50	**P**		112	70	p
17	11			49	31	1		81	51	**Q**		113	71	q
18	12			50	32	2		82	52	**R**		114	72	r
19	13			51	33	3		83	53	**S**		115	73	s
20	14			52	34	4		84	54	**T**		116	74	t
21	15			53	35	5		85	55	**U**		117	75	u
22	16			54	36	6		86	56	**V**		118	76	v
23	17			55	37	7		87	57	**W**		119	77	w
24	18			56	38	8		88	58	**X**		120	78	x
25	19			57	39	9		89	59	**Y**		121	79	y
26	1A			58	3A	:		90	5A	**Z**		122	7A	z
27	1B			59	3B	;		91	5B	[		123	7B	{
28	1C			60	3C	<		92	5C	\		124	7C	|
29	1D			61	3D	=		93	5D	]		125	7D	}
30	1E			62	3E	>		94	5E	^		126	7E	~
31	1F			63	3F	?		95	5F	_		127	7F	DEL

6.4 RS232 Command List

This is a complete list of the RS232 commands that you can use. Some commands must be used in pairs to accomplish the change required. Two indexes of RS232 commands follow this section: 'Index of RS232 Commands' on page 152 and 'Index of RS232 Codes' on page 156. For ascii values, see 'Table of ASCII Hex Values' on page 143

Incr	For toggle commands, such as Lamp On / Lamp Off, **Incr**ement turns it **On.** For value commands, such as Frequency Adjust, this **raises** the value one step.				
Decr	For toggle commands, such as Lamp On / Lamp Off, **Decr**ement turns it **Off.** For value commands, such as Frequency Adjust, this **lowers** the value one step.				
Get	**Get** is an inquiry that must *always* be addressed to a single cube. The response is a binary (hex) number or as text.	*****	is sent as an ascii character and asks for an ascii character in the response.	**$**	is sent as an ascii character and asks for binary (hex) data in the response.
Set	**Set** is followed by a value in binary (hex) or ascii text. Set commands can be addressed to individual cubes or to groups.	**@**	Substitute an ascii character for this symbol in the command line	**#**	Substitute a binary (hex) value for this symbol in the command line.
Ø	Where there might be confusion between 0 (numeral) and O (letter), Ø is used for the numeral.				

RS232 Commands for Lion UXP and XP

Row	Function	RS232 Commands		RS232 Data		Comments
		Incr	Decr	Get	Set	
System Controls						
1	Lamp On/Off	PON	POF	PO*		PON = Run (lamp on) POU = UL lockout (cycle power) POX = Timed lockout; wait POF = Standby; waiting for PON PO? = Unknown state
2	Frequency Adjust	FRU	FRD	FR$	FW#	$ and # = –128 to 127
3	Phase Adjust	PHU	PHD	PR$	PW#	# = 0 to 31
4	V-Position Up/Down	VPU	VPD			Get/Set, see Get/Set Top (Row 95-96)
5	H-Position Left/Right	HPL	HPR			Get/Set, see Get/Set Left (Row 89-90)
6	Image H Normal/Flip	HFØ	HF1	HF*		Ø = Normal 1 = Flip (reversed)
7	Curtain	CON	COF	CO*		CON = on COF = off
8	Curtain Color'			CC$	CC#	1 = red 2 = green 3 = blue 4 = black 5 = white
9	Sharpness	SON	SOF	SO*		SON = on SOF = off
10	Buzzer	BON	BOF	BO*		BON = on BOF = off
11	Remote IR Enable/Disable	ION	IOF	IO*		ION = on IOF = off
Hours Controls						

RS232 Commands for Lion UXP and XP

Row	Function	RS232 Commands		RS232 Data		Comments
		Incr	Decr	Get	Set	
12	Read Lamp Hours			L@$ (see Comments)		Requires two commands to get value: L1$ = Get Front Lamp high byte L2$ = Get Front Lamp low byte L3$ = Get Rear Lamp high byte L4$ = Get Rear Lamp low byte
13	Reset Lamp Hours	LR				Reset Lamps Hours to zero
14	Reset Lamp Hours	LR@				Reset Lamps Hours to zero @ = 1 (Front), 2 (Rear) S = both lamps
15	Read System Hours (low byte)			TL$		Hours that electronics module has been on.
16	Read System Hours (high byte)			TH$		
17	Read Runtime Hours, low byte			RL$		Hours that lamp has been on
18	Read Runtime Hours, high byte			RH$		
Lamp Rest and Local Clock						
19	Hour to start Lamp Rest cycle			S4$	S4#	# = 0–23 hour to start cycle $ = 0–23 if enabled, 255 if disabled
20	Local Clock, hours			CH$	CH#	Hours = 0–23
21	Local Clock, minutes			KM$	CM#	CM# Set minutes 0–59 KM$ Get minutes [Note: KM is not a misprint.]
22	Lamp Count			LC$	LC#	Binary (hex) 1–4; Set number of lamps desired, or Get number of lamps on
23	Lamp Status			LA@		LA1 queries Front lamp status. LA2 queries Rear lamp status. Responses are: LAN = lamp on LAF = lamp off LAK = lamp striking LAS = lamp shutting down LAD = lamp failed LAR = lamp is resting

RS232 Commands for Lion UXP and XP

Row	Function	RS232 Commands		RS232 Data		Comments
		Incr	Decr	Get	Set	
Source and Mode Select						
24	Select Input			IN*	IN@	1 = Analog 1 2 = Analog 2 3 = Digital [4 = (not used)] 5 = C-Video 6 = S-Video (Get/Set values received/sent as text)
25	Select Mode if Analog 1, Analog 2 or Digital in the source * When C-Video or S-Video is the source, the only modes available are NTSC, PAL, and SECAM. These three modes to do not appear when Analog 1 or 2 or Digital is the source.			IM$	IM#	1. VGA 60Hz 2. VGA 72Hz 3. VGA 75Hz 4. VGA 85Hz 5. SVGA 56Hz 6. SVGA 60Hz 7. SVGA 72Hz 8. SVGA 75Hz 9. SVGA 85Hz 10. XGA 60Hz 11. XGA 70Hz 12. XGA 75Hz 13. XGA 80Hz 14. XGA 85Hz 15. SXGA 60Hz 16. SXGA 75Hz 17. SXGA 85Hz 18. UXGA 60Hz 19. (not used) 20. (not used) 21. (not used) 22. (not used) 23. Mac 640 × 480 67Hz 24. Mac 800 × 600 75Hz 25. VESA 720 × 400 70Hz 26. VESA 720 × 400 85Hz 27. HDTV 1080i 60Hz 28. HDTV 720p 60Hz 29. 1024 × 1024
Save and Recall						
26	Save in numbered memory				SA#	Memory numbers 1 through 72
27	Recall numbered memory				RC#	
28	Save global settings				SA#	255 = Save settings not assigned to memory numbers.
29	Delete Settings				DL#	# = Hex values 1-72

RS232 Commands for Lion UXP and XP

Row	Function	RS232 Commands		RS232 Data		Comments
		Incr	Decr	Get	Set	
30	H in V sync	HV1	HVØ	HV*		1 = Normal Ø = Use only when there is no H in V sync
Input Level						
31	Auto-adjust Black Input Level	ABL				
32	Input Black Offset Adjust ALL	OAU	OAD		QA#	# = 0–63
33	Input Black Offset Adjust Red	ORU	ORD	OR$	QR#	
34	Input Black Offset Adjust Green	OGU	OGD	OG$	QG#	
35	Input Black Offset Adjust Blue	OBU	OBD	OB$	QB#	
36	Auto-adjust White Input Level	AWL				
37	Input White Level Adjust ALL	LAU	LAD		IA#	# = 0–255
38	Input White Level Adjust Red	LRU	LRD	LR$	IR#	
39	Input White Level Adjust Green	LGU	LGD	LG$	IG#	
40	Input White Level Adjust Blue	LBU	LBD	LB$	IB#	
41	Input Level Data Red			DR$		Read red sample
42	Input Level Data Green			DG$		Read green sample
43	Input Level Data Blue			DB$		Read green sample
Move Input Level Sample Point						
44	X coordinate			BX$	AX#	# = 0–255
45	Y coordinate			BY$	AY#	# = 0–255
46	Sample point disable/enable	DRØ	DR1			DRØ disables sample point; uses last sample values. DR1 enables new data from the sample point.
Color Balance						
47	Red Color Balance Adjust (white)	BRU	BRD	BR$	CR#	# = 0–31
48	Green Color Balance Adjust (white)	BGU	BGD	BG$	CG#	
49	Blue Color Balance Adjust (white)	BBU	BBD	BB$	CB#	
50	Red Color Balance Adjust (gray)	GRU	GRD	GR$	RR#	# = 0–15
51	Green Color Balance Adjust (gray)	GGU	GGD	GG$	RG#	
52	Blue Color Balance Adjust (gray)	GBU	GBD	GB$	RB#	
53	Gamma On/Off	GON	GOF	GO*		N = on F = off
54	Save, Recall from Clipboard	CLS	CLR			S = Save R = Recall
Auto Detect and other automatic functions						
55	Auto Detect	ATØ	AT1	AT*		Ø = off 1 = on 2 = activate once
56	Source Absent Message	ASØ	AS1	AS*		Ø = off 1 = on
57	Auto Detect Message	AMØ	AM1	AM*		Ø = off 1 = on
58	Auto Phase			AH*	AH@	Ø = Auto Phase off 1= Auto Phase on (works only if Auto Detect is on or activated) 2 = Activate Auto Phase one time

RS232 Commands for Lion UXP and XP

Row	Function	RS232 Commands		RS232 Data		Comments
		Incr	Decr	Get	Set	
59	Auto Position			AP*	AP@	Ø = Auto Position off 1 = Auto Position on (works only if Auto Detect is on or activated) 2 = Activate Auto Position one time
60	Auto Re-strike	LF1	LFØ	LF*		1 = active Ø = inactive
61	Auto Loop Enable	AL1	ALØ	AL*		1 = on Ø = off
Test Signals						
62	Test Signal Disable (pass video)	TSD				Removes test signal and displays video
63	Test Signal - White Field	WHT				White
64	Test Signal - Black Field	BLK				Black
65	Test Signal - 50% Gray Field	GRY				Gray
66	Test Signal - Red Field	RED				Red
67	Test Signal - Green Field	GRN				Green
68	Test Signal - Blue Field	BLU				Blue
69	Test Signal - Alignment	GE1				Alignment dashes
70	Test Signal - Geometry	GE2				Geometry pattern
71	Test Signal - Gray Scale	GE3				Gray Scale
72	Test Signal - Inquiry			TS$		Ø = none 1 = black 2 = gray 3 = white 4 = red 5 = green 6 = blue 7 = custom test pattern from TR#, TG# and/or TB# 8 = alignment dashes 9 = geometry pattern 10 = gray scale
73	Test Signal - Data Red				TR#	Set test signal red level 0–255
74	Test Signal - Data Green				TG#	Set test signal green level 0–255
75	Test Signal - Data Blue				TB#	Set test signal blue level 0–255
Temperature Sensors						
76	Temperature Sensors			T@$		1 = board 2 = power supply 3 = lamp 4 = inlet air Response is hex °C
Fan Sensors						
77	Fans			FS$		Bit field report of failed fans 0 = Intake 1 = Exhaust 2 = Optics 3 = Lamp 4 = F Ballast 5 = R Ballast 0000 0000 = fans normal 0011 0000 = both ballast fans failed
LCD Adjustment Motors						
78	LCD Motor, Right Edge	M1	M1			The directions F/B (Forward/Back) indicate the direction of motor movement, but not necessarily the direction of image movement.
79	LCD Motor, Horizontal	M2	M2			
80	LCD Motor, Left Edge	M3	M3			

RS232 Commands for Lion UXP and XP

Row	Function	RS232 Commands		RS232 Data		Comments
		Incr	Decr	Get	Set	
Wall Processor						
81	Wall width			WX$	WX#	$ and # = 1–32
82	Wall height			WY$	WY#	
83	Unit Location, Column			PX$	PX#	
84	Unit Location, Row			PY$	PY#	
85	Wall Mode On/Off	WM1	WMØ	WM*		Ø = Off 1 = O n
Aspect Ratio						
86	Aspect Ratio Horizontal			AC$	AC#	Ø = fill 1 = left 2 = center 3 = right
87	Aspect Ratio Vertical			AD$	AD#	Ø = fill 1 = top 2 = middle 3 = bottom
Zoom Control						
88	Zoom, Left Edge	ZLU	ZLD			
89	Get/Set Left Edge (high byte)			ZØ$	XØ#	To Set, always send the high byte first, and always send both bytes. After all 8 settings have been sent, send XGO (letter O) to ‘make it so.’
90	Get/Set Left Edge (low byte)			Z1$	X1#	
91	Zoom, Right Edge	ZRU	ZRD			
92	Get/Set Right Edge (high Byte)			Z2$	X2#	
93	Get/Set Right Edge (low byte)			Z3$	X3#	
94	Zoom, Top Edge	ZTU	ZTD			
95	Get/Set Top Edge (high byte)			Z4$	X4#	
96	Get/Set Top Edge (low byte)			Z5$	X5#	
97	Zoom, Bottom Edge	ZBU	ZBD			
98	Get/Set Bottom (high byte)			Z6$	X6#	
99	Get/Set Bottom Edge (low byte)			Z7$	X7#	
Video Decoder						
100	Brightness	D1U	D1D			$ and # = –128 to 127; –10 is default
101	Get/Set Brightness			F2$	E2#	
102	Contrast	D2U	D2D			$ and # = 0 to 63; 54 is default
103	Get/Set Contrast			F4$	E4#	
104	Saturation	D3U	D3D			$ and # = 0 to 4094; 3900 is default Send high byte first. Display is updated when the low byte is sent. This is always an even number.
105	Get/Set Saturation (high byte)			F5$	E5#	
106	Get/Set Saturation (low byte)			F6$	E6#	
107	Hue	D4U	D4D			$ and # = –512 to 512; 0 is default Send high byte first. Display is updated when the low byte is sent
108	Get/Set Hue (high byte)			F7$	E7#	
109	Get/Set Hue (low byte)			F8$	E8#	

RS232 Commands for Lion UXP and XP

Row	Function	RS232 Commands		RS232 Data		Comments
		Incr	Decr	Get	Set	
On-Screen Status Code and Last Interlock						
110	Last Interlock			LI$		0 = no fault 1 = Intake fan 2 = Exhaust fan 3 = Optics fan 4 = Lamp Fan 5 = F Ballast fan 6 = R Ballast fan 10 = board over temp 11 = power supply over temp 12 = lamp over temp 13 = inlet air over temp 21 = lamp bay door open (interlock) 22 = both lamps failed (interlock) 23 = 350V power supply failed 255 = unknown failure
111	Automatic code display	ABN	ABF	AB*		N = enable automatic codes F = disable automatic codes
System Monitor						
112	Ping			PNG		Verifies that a cube is at an address.
113	Product ID			PØØ		Gets the product ID (hex) In the About menu, the project number is 573-xxyy-zz. The xx value is returned as a hex number.
114	Version ID			VER		Get software version ID (hex) 0x01 = Rev A 0x02 = Rev B 0x03 = Rev C, etc.
115	Lamp Out Counter			S1$	S1C	Get/Clear lamp out count (number of lamp out “events,” such as power brown-outs)
116	Re-strike Attempts			S2$	S2C	Get/Clear re-strike count
Responses from display, if it is individually addressed						
117	Received Valid Command	ACK				Command is valid; attempting to execute
118	Received Invalid Command	NAK				Command is valid; cannot execute at this time
119	Unknown Command	UNK				Unknown command
120	Parameter Error	ERR				First two characters of command are valid, but third character (value character) is out of range.

RØØ	**RØ1**	**RØ2**
R1Ø	**R11**	**R12**
R2Ø	**R21**	**R22**
R3Ø	R31	**R32**
R4Ø	**R41**	**R42**
R5Ø	**R51**	**R52**
R6Ø	**R61**	R62
R7Ø	R71	**R72**
R8Ø	**R81**	R82

The RS232 codes shown here produce the effect of pushing the corresponding buttons on the remote control. For instance, sending the code $02Ø5R2Ø$03 will turn off the lamps in the display with RS232 address Ø5, because that has the same effect as pressing the Lamp Off button on the remote control.

There is no difference to the display between sending the R61 command and actually pressing the up arrow on the remote.

When an 'R' command opens a menu, the highlight bar will be where it was the last time the menu was closed, and you probably won't know where that is.

Some of the buttons do not exist on the remote control.

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7 Troubleshooting

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7.1 Solving Power and Startup Problems

When you see nothing but black on the screen, it is probably a startup problem. If the image is there, but it is not right, it is an image problem, covered in the next section.

Things to check if you have no image:

- Is the AC Master switch lit?
- Is the unit plugged in?
- Is there power in the AC mains?
- Press the MONITOR button on the remote control. This will display the Status menus, if the lamps are on. It also starts the On-Screen Status Code, which should appear whether the lamps are on or not. These two LEDs blink in a pattern to tell you why the lamps are not lit. If you see a steady amber light that does not blink, it means the lamps are on and there is no alarm.

✎See 'On-Screen Diagnostic Codes and LEDs' on page 192 to interpret the code.

Lamps are on, but screen is black (or some other color)

These events will cause the screen to be a solid color (usually black). They are listed in order of priority.

1. User Curtain is on. ('Curtain and Its Colors' on page 130.)
2. Test Pattern is on. ('Test Patterns' on page 134.)
3. Auto Detect is searching. ('Mode Detect in Action' on page 80.)
4. There is no source picture; Source Absent. (See Src Abs Msg on page 120.)
5. Wall settings and Aspect Ratio are set so this particular cube has no picture. ('Setup Part 2: Walls' on page 92, and 'How to Use Clarity's Big Picture™' on page 94.)

✎ There are no user serviceable parts in either the electronics module or the power supply.

This is the normal startup sequence

1. AC power is applied. Either the main circuit breaker switch is turned on, or AC is reacquired after a power loss.
2. Several LEDs on the electronics module turn on and off as the Lion gets started. This initialization phase is about 15 seconds.
3. After initialization, the Standby LED turns on, and all the fans stop. However, if Auto Lamp is On (in the MISC menu) the fans stay on, and lamp ignition starts right away.
4. Lamp Ignition: The system receives an On command from the remote or RS232 or Auto Lamp On.
5. All fans run. The system attempts to ignite each lamp in turn with a one second delay between each lamp start. It always starts with Front Lamp, then Rear Lamps.

✎ If the Lamp Bay door is open, and its interlock switch is open, no lamps will ignite. If lamps are already on when the door opens, they all go off. When the Lamp Bay door is opened, the Lockout LED goes red. To relight lamps, you must close the Lamp Bay door and cycle AC power.

✎ If *any* fan fails to operate, the lamps will not ignite or will go off if they are on.

6. All requested lamps are on.
7. When the system receives an Off command, all lamps turn off immediately. All lamp LEDs go out.
8. All fans stop, and the Standby LED turns on.

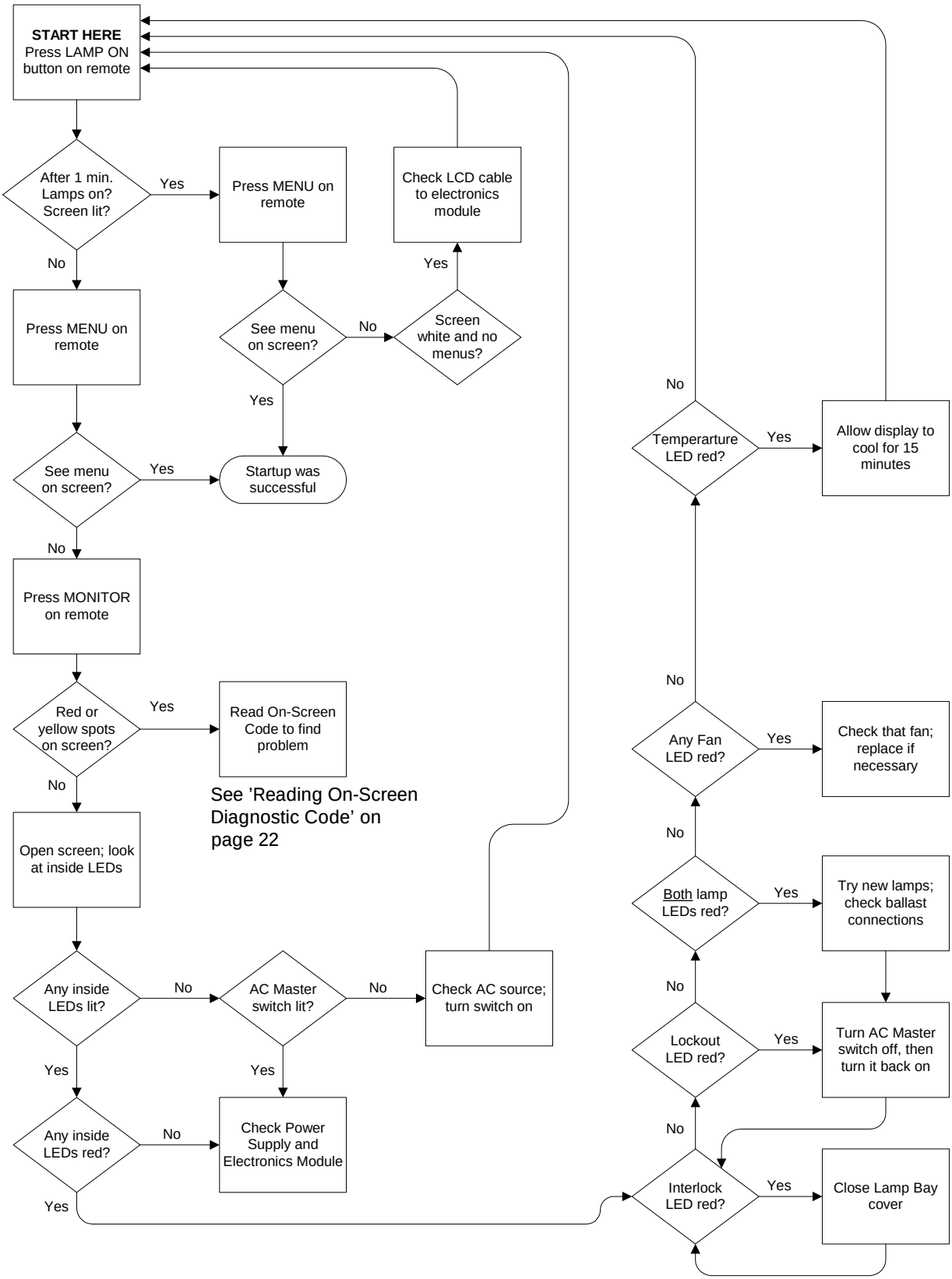
Lamp strike sequence

The lamps always ignite, or try to ignite, in this order: front, rear.

About UPS supplies

Some installations use a UPS—Uninterruptible Power Supply. These will work on the Lion *if* the output of the UPS is a sine wave.

Many UPS systems have square wave or stepped wave outputs. These types may not work with Lion. The Lion 350-volt power supply requires a sine wave input.


START HERE
Press LAMP ON button on remote
After 1 min. Lamps on? Screen lit?
Yes
Press MENU on remote
Check LCD cable to electronics module
No
Press MENU on remote
See menu on screen?
No
Screen white and no menus?
Yes
Yes
See menu on screen?
Yes
Startup was successful
No
Press MONITOR on remote
Red or yellow spots on screen?
Yes
Read On-Screen Code to find problem
No
See 'Reading On-Screen Diagnostic Code' on page 22
Open screen; look at inside LEDs
Any inside LEDs lit?
No
AC Master switch lit?
No
Check AC source; turn switch on
Yes
Yes
Any inside LEDs red?
No
Check Power Supply and Electronics Module
Yes
No
Temperarture LED red?
Yes
Allow display to cool for 15 minutes
No
Any Fan LED red?
Yes
Check that fan; replace if necessary
No
Both lamp LEDs red?
Yes
Try new lamps; check ballast connections
No
Lockout LED red?
Yes
Turn AC Master switch off, then turn it back on
No
Interlock LED red?
Yes
Close Lamp Bay cover

7.2 Solving Image Problems

If you can see the image, but it is not right, this is the place to start. Image problems include skewed, rotated and keystoned pictures, pictures that are the wrong size, and pictures that are torn or noisy. If you can't see an image, turn back one page.

What to do about image problems

What is wrong?	What to do to fix it.
The image is **reversed** left and right.	On the remote control, press MENU. Select Misc Control and press ENTER. Select Flip Horz and press ENTER.
The **white** areas are 'blooming,' too white.	Go to 'Analog Level Adjustments' on page 84.
The **black** is too black. The areas in the dark parts of the image all one shade, all black.	Go to 'Analog Level Adjustments' on page 84.
The images are **noisy**. There are horizontal streaks in the picture, especially at the edges of high contrast.	Go to 'Frequency and Phase' on page 82.
There are **vertical bands**, light and dark, in the image.	Go to 'Frequency and Phase' on page 82.
There is a **dark line of no video** on the top, bottom, left or right side.	Go to 'An Important Step: Aligning the LCD' on page 70. Check the Aspect Ratio setting, as described on page 94.
The image is **too large** or **too small**.	This may be due to improper lens adjustment. Check this at 'An Important Step: Aligning the LCD' on page 70. If you are using Clarity's Big Picture™, it may be a zoom problem. See 'Zoom Adjustments' on page 102.
The screen is one solid color: black, red, green, blue, or white.	Check Test Patterns to see that they are Off. See 'Lamps are on, but screen is black (or some other color)' on page 160.
The image is **not bright enough**.	How many lamps are you using? Look at the Lamp Control menu. Are any lamps 'Failed'? See 'What To Do First' on page 68.
The screen flashes to red (or green or blue or white) when I change the source.	Check Curtain in the Main menu; When the Curtain is On, it can have any of these colors. See 'Curtain and Its Colors' on page 130.
Using **HDTV 1080i mode**, the picture jumps around and looks incorrect.	See 'Special Notes for 1080i & 1024i Modes' on page 90.

7.3 Getting Technical Support

Before you call or email, get the serial number of the displays you are having trouble with. Have you searched the Index of this manual?

Most of your questions are answered somewhere in this manual. Check the Index.

If the problem you have is completely baffling, call, email or fax.

But first!

Get the **serial number** of the unit you have. The serial number is found

- inside on the right (as seen from the front) wall of the display behind the screen.
- on the back outside of the display.

Try to describe the problem in the most precise language you can. Remember, the person you are talking to or writing to cannot see what you see.

Un-helpful language:

- It looks funny.
- The picture doesn't look right.
- The image is bad.
- It isn't working.

Helpful language:

- I see horizontal streaks from the right side of high contrast edges.
- A solid green background has vertical bands in it.
- Whenever I try to "_____", I get a message on the screen that says "_____".
- The lamp did not come on. When I swapped it with another lamp, it still did not come on.
- There is a black line on the left side, and I can't move the picture over there with the Position control.
- The flashing lights on the screen flash in this sequence.

Clarity Visual Customer Service

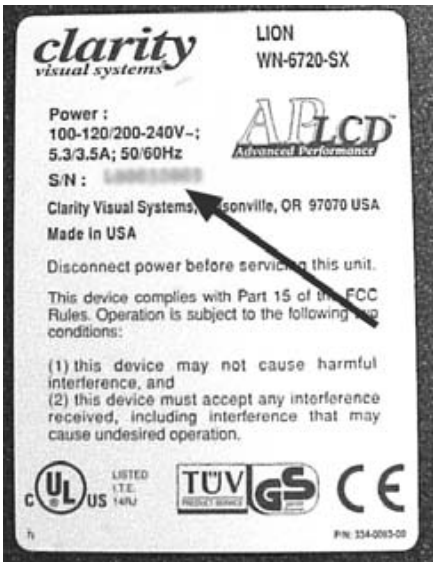
+1 503 570 4634 voice,
M-F, 0700-1700, U.S. Pacific time
service@clarityvisual.com

+1 503 570 4657 fax

Clarity Visual Systems
Attn: Customer Service
9025 SW Hillman Court, Suite 3122
Wilsonville, OR, USA
97070–7708

REMEMBER, HAVE THE SERIAL NUMBER READY.

Arrow points to the serial number.



Serial number sticker, showing location of the serial number.

8 Routine Maintenance

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8.1 Removing a Lamp

To remove a lamp, first remove the light engine.

CAUTION
The lamp MUST be installed correctly. If it is not installed correctly, the light from it will not be aimed correctly and sensitive optical parts may be damaged.

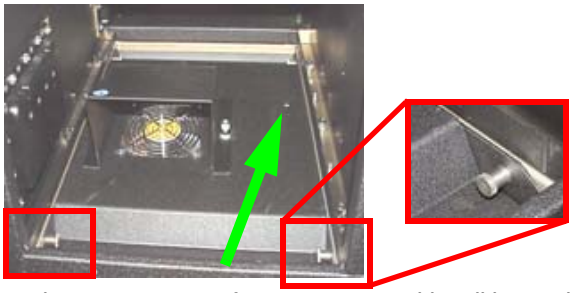
To remove a lamp

1. Determine which lamp to change.
   a) Press MONITOR on the remote to open the Cube Status menu.
   b) Look for the lamp that is out. —or—
   c) Look in the Electronics Bay at the Diagnostic LEDs to determine which lamp is out.
2. Turn off all lamps and disconnect power cord.
3. If changing from the front, open the screen. (“Opening and Closing the Screen” on page 60)
4. If changing from the rear, open the rear panel of the Lamp Bay.

WARNING
Even when the lamps are off, the lamp tips are still electrically “hot.” Turn off the main power switch!

WARNING
Turn off the power and allow the lamps to cool for a minute before removing a lamp.

5. Open the Lamp Bay cover.
   a) Remove the screw that holds the Lamp Bay door closed.
   b) Pull inward on the two spring-loaded pins at end of the Lamp Bay cover nearest you and lift up.

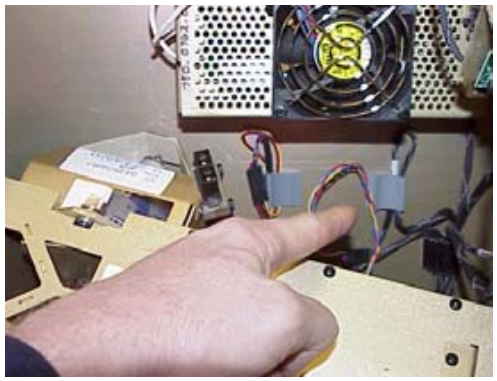


5. a) Lamp Bay seen from **rear**. Arrow points to screw.

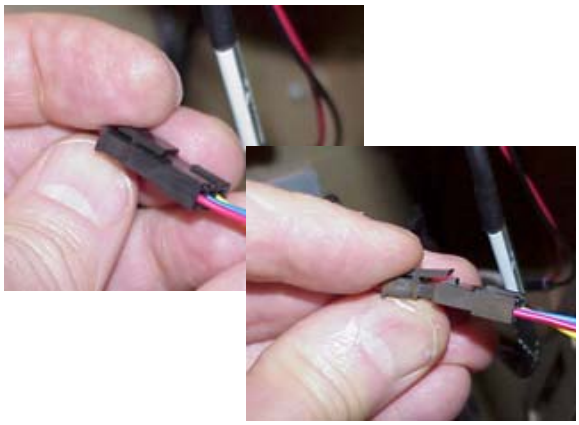
5. b) Pull in on pins nearest you and lift up.

6. Disconnect *both* lamp cables.

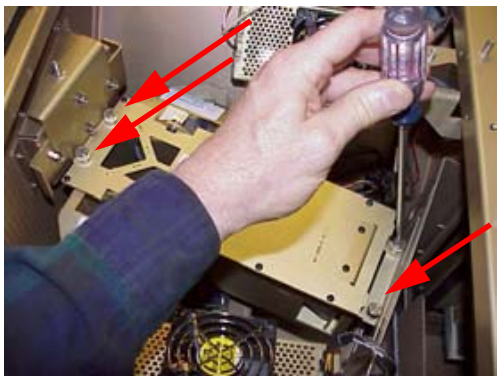
7. Release the Optical Fan cable from its clip.



8. Disconnect the Optical Fan cable.



9. Loosen the 4 screws that hold the light engine in place.



10. Lift out the light engine. The arrow points to the flexible mounting at its output end.

✎ You may move the light engine back and forth along its long axis to get it out. The output end, toward the Center Bay, is flexible. You may bend it somewhat, as long as it will go back to its original shape.

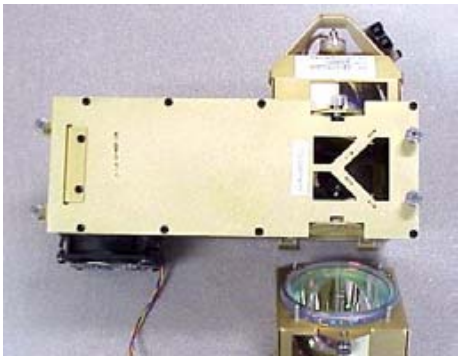
Light engine flexible mounting at the output end, toward Center Bay.

⚠ *CAUTION*

Do not touch any optical part of the light engine. The mirrors and filters in it don't need your fingerprints.

Do not touch these optical parts.

11. Remove the lamp by loosening the lamp screw.



8.2 Installing a Lamp

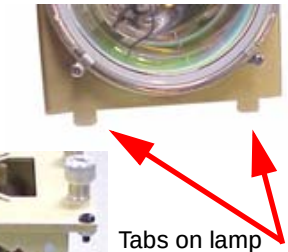
If the lamp is not installed correctly, optical parts may be damaged.

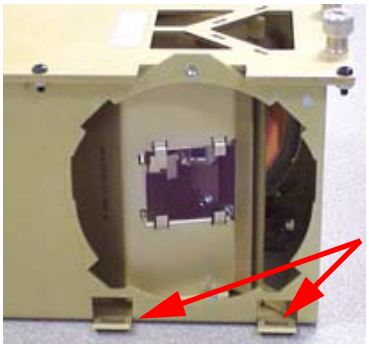
⚠ *CAUTION*
The lamp MUST be installed correctly. If it is not installed correctly, the light from it will not be aimed correctly and sensitive optical parts

To install a lamp, the light engine must be removed from the Lion.

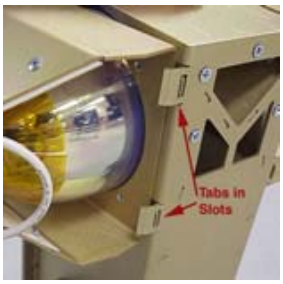
✎ If the light engine has not been removed from the Lion, go to the previous section for instructions (“Removing a Lamp” on page 168.)

1. Install the new lamp by putting the tabs in the slots on the light engine and tightening the screw with a screwdriver.



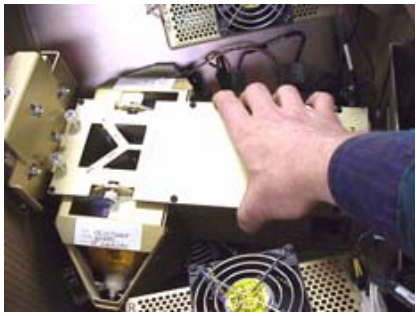


2. Check the bottom of the light engine to see that the tabs are in the slots …



… and that the lamp housing edges are flush with the light engine.

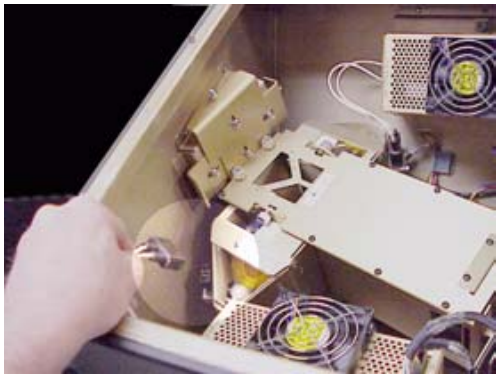
3. Put the light engine in the Lamp Bay.



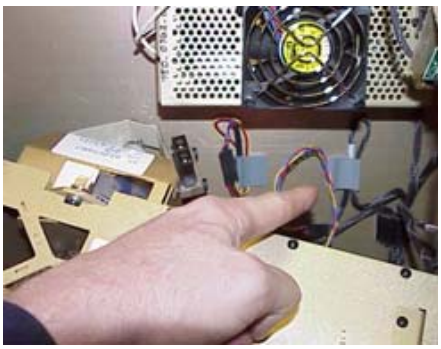
You can push on the flexible part of the light engine mount to get the light engine in place.

4. Tighten the 4 light engine screws.

5. Reconnect the two lamp cables.



6. Reconnect the Optical Fan cable and put the cable in its clip.



7. Close the Lamp Bay cover and reconnect power.

8.3 Changing the Air Filter

If the wall is tilted, you must work from the rear.

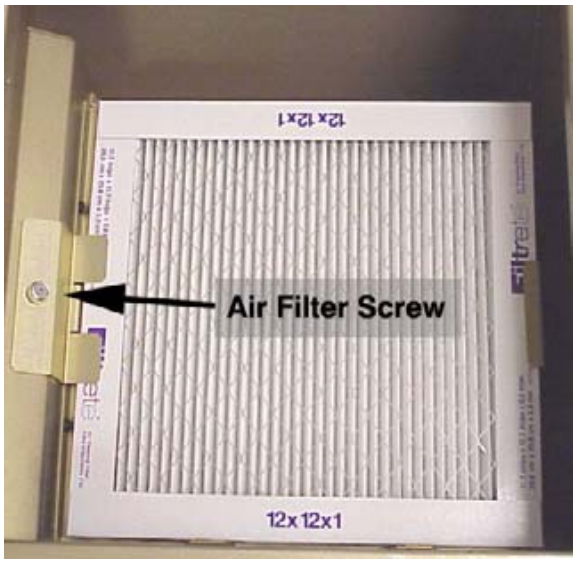
The air filter should be changed at about 8000 lamp hours, more often if the system is used in dusty, dirty or greasy environments.

To change the air filter from the front

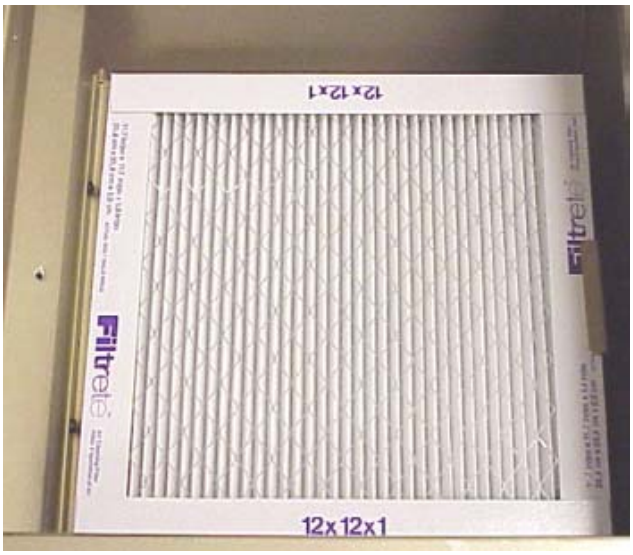
1. Open the screen. (“Opening and Closing the Screen” on page 60)
2. Turn off the power and remove the power cord. [Ziehen Sie vor Wartungs-/Reinigungstätigkeiten immer den Netzstecker.]
3. Open the Air Intake Bay cover by pulling in on the front (near) spring-loaded pins.
4. Loosen the screw that holds the filter and remove this bracket.
5. Lift the filter from the side nearer the middle of the Lion. The other side has a tab that bends over the filter.
6. Remove the filter and discard it.
7. Install the new filter with the “Air Flow” arrows on the filter pointing down.\
8. Replace the bracket and screw it down. Finger tight is enough.
9. Close the Air Intake Bay cover and be sure the pins go in their proper holes.
10. Reconnect power and turn on the main power switch.

To change the filter from the rear

1. At the Electronics Bay, turn off the main power switch and remove the power cord. [Ziehen Sie vor Wartungs-/Reinigungstätigkeiten immer den Netzstecker.]
2. Remove the rear panel of the Air Intake Bay by turning the quarter-turn screws.
3. Open the Air Intake Bay cover by pulling in on the rear (near) spring-loaded pins.
4. Loosen the screw that holds the filter and remove this bracket.
5. Lift the filter from the side nearer the middle of the Lion. The other side has a tab that bends over the filter.
6. Install the new filter with the “Air Flow” arrows on the filter pointing down.\
7. Replace the bracket and screw it down. Finger tight is enough.
8. Close the Air Intake Bay cover and be sure the pins go in their proper holes.
9. Close the rear panel of the Air Intake Bay.
10. At the Electronics Bay, reconnect the power cord and turn on the main power switch.

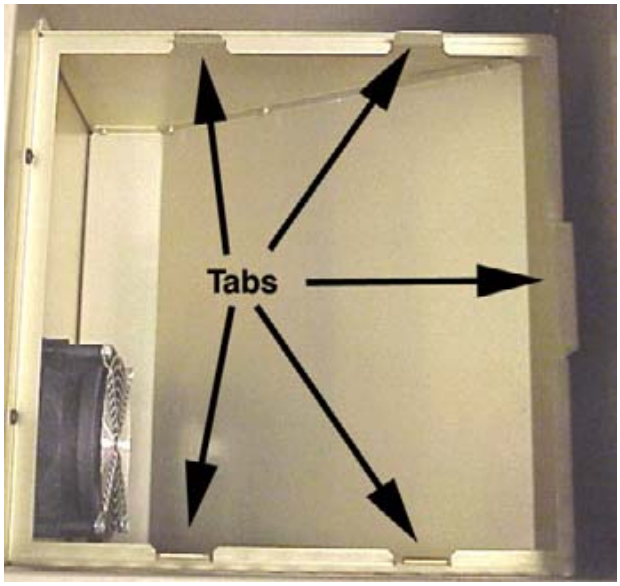


Air filter as seen from the rear.



Air filter with bracket removed.

Lift air filter from the side toward the center of the Lion.



New air filter must fit between tabs in front and rear and under the tab shown on the right (seen from rear).

8.4 Cleaning the Screen, Mirror

The screen is glass and fingerprints show up on it. Most of these may not show in the picture, but a clean screen is better.

⚠ *CAUTION*
Whether the screen is glass or acrylic, don't lean on it. Don't let it get scratched. Protect it.

⚠ *CAUTION*
Spray the cleaner on the cloth. NEVER spray anything on the screen. Do not let any liquid drip down the screen. It will wick up between the screen layers. When liquid gets between the screens, it is *impossible* to remove. The screen is permanently ruined.

Why is the screen ruined?

The screen is made of several layers. The outer layer is glass, but there are inner layers of acrylic that are Fresnel lenses. If liquid runs down the screen, collects at the bottom and wicks up between these layers, it is impossible to get it out.

Both sides

You can safely clean both sides of the screen, as long as you are careful to prevent liquid from running down to the bottom of the screen.

Cleaners to use

Claire #50 Glass Cleaner is good glass cleaner. It is a foaming spray in a pressurized can. It is sold under many different names by local companies that sell janitor and building maintenance supplies.

In some parts of the world this same cleaner is known as **Sprayway #50 Glass Cleaner**. Ask at a janitor supply company for either of these cleaners. Hundreds of supply companies sell this product under their own brand name.

Glass Wax™ does a good job of cleaning the screen. It is a thick, pink liquid. Put some on a clean, damp cloth and or a clean, damp sponge and spread it thinly on the screen. Let it dry. Wipe up the powder with a clean, dry cloth.

Plain soapy water

You can use plain soapy water to clean the screen. Use a mild liquid soap, very dilute. Wring out or squeeze out *most* of the water. (Read the Cautions on this page.) Wipe carefully with the damp cloth. Dry with a second cloth.

Cleaners NOT to use

- Do not use any cleaner that has an abrasive material, such as sink and porcelain cleaners, or cleaning compounds that contain pumice. These damage the anti-reflective coating.
- Do not use alcohol on the screen, unless you use it in very small, very controlled areas *not* near the edge. Alcohol can very quickly run down to the edge and wick up between the layers. Alcohol will dissolve some of the material of the black glass screen and make it useless. The *only* way to fix this is to buy a complete new screen.
- Do not use a 'clean' cloth that has been used to wipe something else, such as a table. There could be microscopic particles of grit in the cloth, and these can scratch the screen.
- Do not use a sponge that has been used to clean other things. It is very difficult to get grit out of a sponge, once it is in there. Buy a new sponge, and keep it for this purpose only.

What to use for a cloth

White cotton cloth is better for cleaning than colored cloth. The dyes in some colored cloth tend to make it less absorbent.

Paper towels tend to leave lint. A better paper towel for cleaning is Scott® Shop Towels. These blue, lintless, paper towels are generally available at auto parts stores, home fix-it stores, and hardware stores.

Cheesecloth is another good choice. This open-weave cotton material is light and absorbent.

Same cleaner for mirrors, lens

You may use the same cleaner for the large mirror and the lens. However, in most instances, the mirror and lens only have dust. It is best to blow this away using clean air, or wipe it away using a clean cloth. Clean, compressed air is available in pressurized cans from stores that sell cameras.

What about dust?

If the mirror has only light dust and nothing greasy or oily, you can wipe the dust of with a dry cloth. Or use a Swiffer™. Swiffers are good at picking up dry

dust, but they will not remove oil or grease, and they can't be used with liquid cleaners of any kind.

Where is the dirt?

When you see dirt in the picture, you can sometimes tell where it is by its focus. Use a white test pattern to see the dirt most easily.

Small specs of dirt or dust that are in **very sharp** focus are either on the screen itself, or they are on the LCD.

If the dirt is **slightly out of focus**, it may be on the input or output Fresnel lens.

If the dirt is in **soft focus**, it is probably a smudge on the large mirror.

Dirt on the output lens cannot be seen in the picture. However, that does not mean you should not clean this lens. Dirt here will reduce the brightness of the picture, but it won't show up as specs in the picture.

Stuck pixels

Sometimes you will see a stuck pixel. This will show as a bright spot of color, easily visible on a black test pattern. Stuck pixels are not unusual. Up to ten stuck pixels is within the warranty tolerance, as long as they are not touching each other.

8.5 Upgrading Lion UXP Firmware

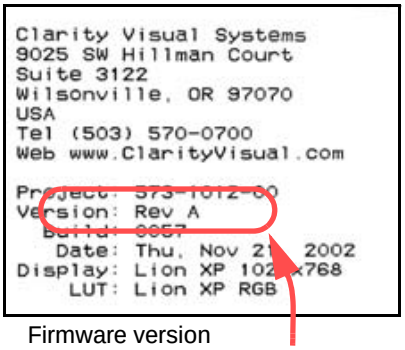
From time to time Clarity may change the Lion firmware to add features or correct minor problems.

The electronics module has a dedicated serial port for downloading new firmware. This Load Data port supports xmodem transfers of binary files at **115.2 kbps** (only). The display continues to operate while the new firmware is loaded.

Download the new firmware from www.clarityvisual.com, Reseller area.

Check the current firmware version

Look at the About menu (MENU > About) to see if you need to upgrade.



Firmware version

Access the electronics module

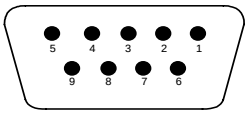
This upgrade can be accomplished from either the front or the back of the display. To access from the back, remove the center bay cover. It is held in place by four spring loaded plungers. Release the plungers from their detents and remove it. To access from the front, open the screen..

Connect the PC to the Lion UXP

Use a female 9-pin to RJ45 adapter, available at electronics and computer stores and wire it as shown.

Yellow wire	pin 3
Black wire	pin 2
Green wire	pin 5

RJ45	9-pin
6	3
5	5
3	2



Connect a straight-thru cable with RJ45 connectors at each end (computer network cable) from the adapter to the Lion's Load Data connector.

✎ Do NOT use the RS232 connectors on the electronics module for firmware upload in Lion. It won't work.

Lion UXP electronics module showing the Load Data and Trace ports.

Set up the communications software

Turn an AC power to the Lion. It is not necessary to turn on the lamp.

Start the download to Lion

The upgrade firmware is an executable file. Click on the file name to start the download and follow the on screen instructions.

1. You see this screen first.

2. Then you see this one.

IMPORTANT!
Make sure cube AC power is ON. Make sure the lamps are OFF. This can be accomplished by pressing the <OFF> button on the remote. Make sure your serial cable is connect to the LOAD DATA port.
OK

3. In the third screen you choose the Comm Port in an strange way.

4. If you have trouble, this is how to abort. Clicking OK on this screen starts the download.

ABOUT TO START DOWNLOAD
If you need to exit this program during download, press <CTRL> and <BREAK> at the same time. Press <OK> to start download.
OK

CAUTION

Do not use the remote control or send RS232 commands during firmware upload. It will slow the upload process and may cause it to crash.

9 Reference Section

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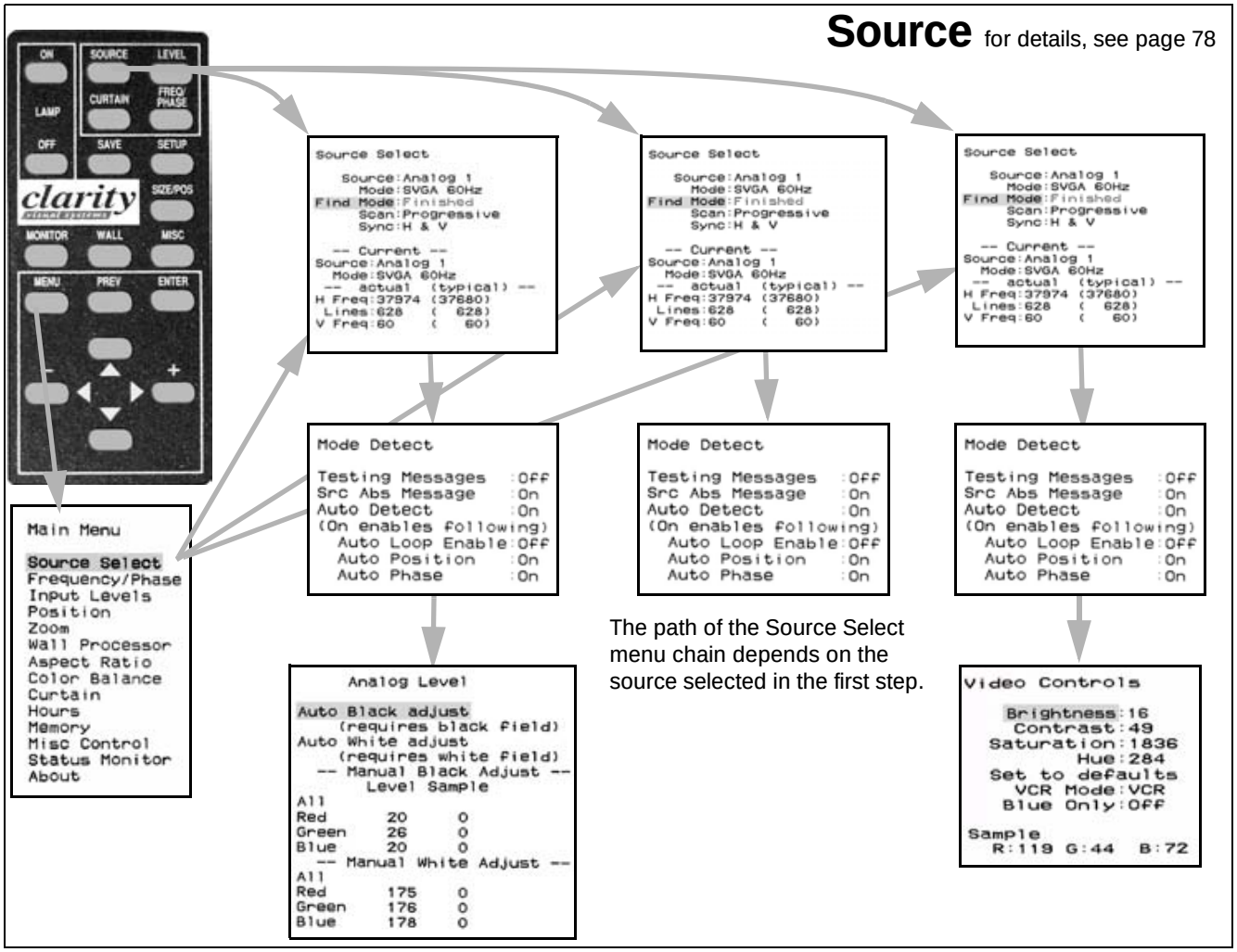
9.1 Menu Structures



Level for details, see page 84, 86, 88

If Analog 1 or Analog 2 is the selected source…

```
     Analog Level

Auto Black adjust
    (requires black field)
Auto White adjust
    (requires white field)
  -- Manual Black Adjust --
      Level Sample
All
Red      20      0
Green    26      0
Blue     20      0
  -- Manual White Adjust --
All
Red      175     0
Green    176     0
Blue     178     0
```

If Digital is the selected source…

```
  Digital Color Control

-Black (OFFset) Adjust-
       Level
All
Red       0
Green     0
Blue      0
-White (Gain) Adjust-
All
Red       0
Green     0
Blue      0

Reset Values
```

If C-Video or S-Video is the selected source…

```
Video Controls

   Brightness:16
     Contrast:49
 Saturation:1836
          Hue:284
 Set to defaults
   VCR Mode:VCR
  Blue Only:OFF

Sample
  R:119 G:44  B:72
```

Freq/Phase for details, see page 82

If Analog 1 or Analog 2 is the selected source…

```
Frequency/Phase

 Frequency:1056 (1056+0)
 Phase:    0
 Find Phase
 Find Freq/Phase
  (requires full width input)
 DeFault Frequency
```

If Digital is the selected source…

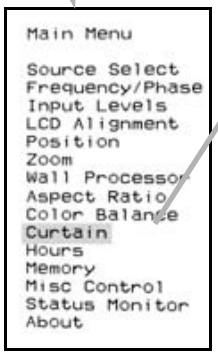
```
Frequency/Phase

These controls apply only
to computer sources.

Press enter to continue
```

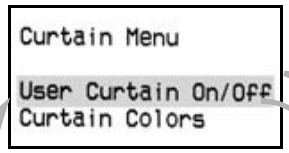
If C-Video or S-Video is the selected source…

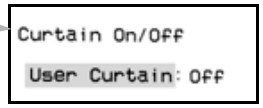
```
Frequency/Phase

These controls apply only
to computer sources.

Press enter to continue
```

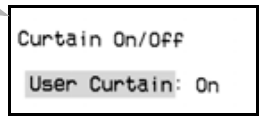
Curtain for details, see page 130

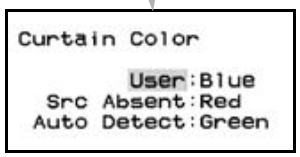
Turns on (or off) the User curtain immediately without showing a menu.

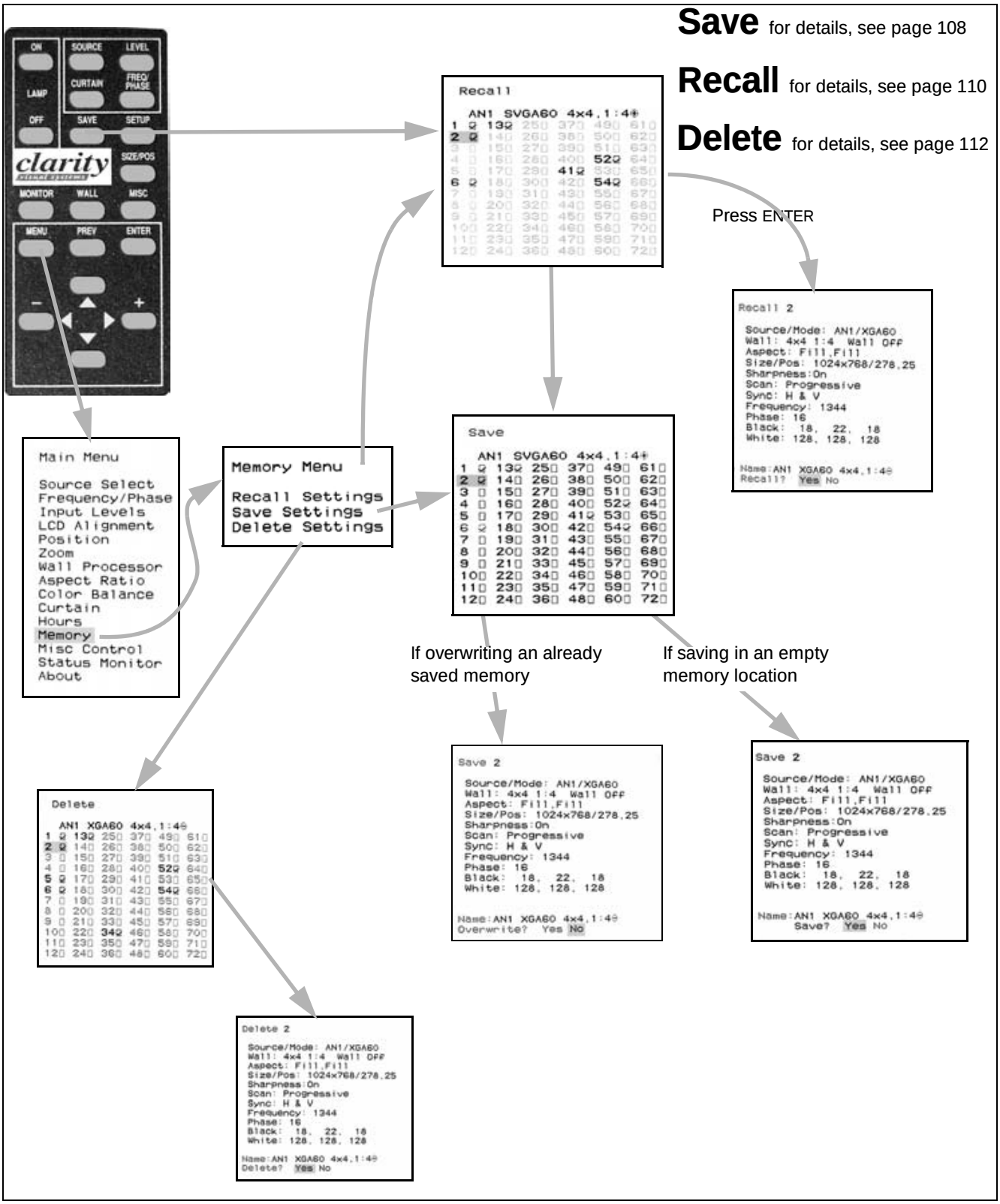











Save for details, see page 108
Recall for details, see page 110
Delete for details, see page 112
ON
SOURCE
LEVEL
LAMP
CURTAIN
FREQ/ PHASE
OFF
SAVE
SETUP
clarity
SIZE/POS
MONITOR
WALL
MISC
MENU
PREV
ENTER
Recall
AN1 SVGA60 4x4,1:4
Press ENTER
Recall 2
Source/Mode: AN1/XGA60
Wall: 4x4 1:4 Wall OFF
Aspect: Fill,Fill
Size/Pos: 1024x768/278,25
Sharpness:On
Scan: Progressive
Sync: H & V
Frequency: 1344
Phase: 16
Black: 18, 22, 18
White: 128, 128, 128
Name:AN1 XGA60 4x4,1:4
Recall? Yes No
Main Menu
Source Select
Frequency/Phase
Input Levels
LCD Alignment
Position
Zoom
Wall Processor
Aspect Ratio
Color Balance
Curtain
Hours
Memory
Misc Control
Status Monitor
About
Memory Menu
Recall Settings
Save Settings
Delete Settings
Save
AN1 SVGA60 4x4,1:4
If overwriting an already saved memory
If saving in an empty memory location
Save 2
Source/Mode: AN1/XGA60
Wall: 4x4 1:4 Wall OFF
Aspect: Fill,Fill
Size/Pos: 1024x768/278,25
Sharpness:On
Scan: Progressive
Sync: H & V
Frequency: 1344
Phase: 16
Black: 18, 22, 18
White: 128, 128, 128
Name:AN1 XGA60 4x4,1:4
Overwrite? Yes No
Save 2
Source/Mode: AN1/XGA60
Wall: 4x4 1:4 Wall OFF
Aspect: Fill,Fill
Size/Pos: 1024x768/278,25
Sharpness:On
Scan: Progressive
Sync: H & V
Frequency: 1344
Phase: 16
Black: 18, 22, 18
White: 128, 128, 128
Name:AN1 XGA60 4x4,1:4
Save? Yes No
Delete
AN1 XGA60 4x4,1:4
Delete 2
Source/Mode: AN1/XGA60
Wall: 4x4 1:4 Wall OFF
Aspect: Fill,Fill
Size/Pos: 1024x768/278,25
Sharpness:On
Scan: Progressive
Sync: H & V
Frequency: 1344
Phase: 16
Black: 18, 22, 18
White: 128, 128, 128
Name:AN1 XGA60 4x4,1:4
Delete? Yes No

Setup

If Analog 1 or Analog 2 is the selected source…

```
Frequency/Phase

 Frequency:1056 (1056+0)
 Phase:     0
 Find Phase
 Find Freq/Phase
  (requires full width input)
 Default Frequency
```

```
      Analog Level

 Auto Black adjust
     (requires black field)
 Auto White adjust
     (requires white field)
   -- Manual Black Adjust --
        Level Sample
 All
 Red        20       0
 Green      26       0
 Blue       20       0
   -- Manual White Adjust --
 All
 Red        175      0
 Green      176      0
 Blue       178      0
```

```
Color Balance

  Test pattern:OFF
  Hide menu
  Reset values
  Save to clipboard
  Recall from clipboard
White balance
  Adjust all  (clipboard)
  Red   21       (31)
  Green 11       (21)
  Blue  12       (22)
Gray balance
  Adjust all
  Red   11       (11)
  Green 11       (11)
  Blue  11       (11)
```

```
 Position
  Image

 Find Position
```

If Digital is the selected source…

```
Color Balance

  Test pattern:OFF
  Hide menu
  Reset values
  Save to clipboard
  Recall from clipboard
White balance
  Adjust all  (clipboard)
  Red   21       (31)
  Green 11       (21)
  Blue  12       (22)
Gray balance
  Adjust all
  Red   11       (11)
  Green 11       (11)
  Blue  11       (11)
```

```
 Position
  Image

 Find Position
```

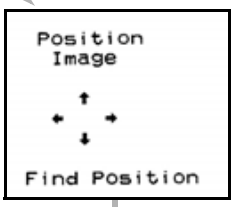
If C-Video or S-Video is the selected source…

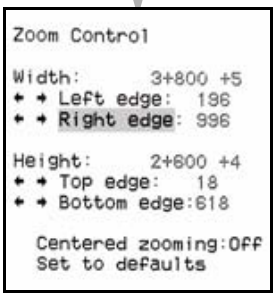
```
Video Controls

    Brightness:16
      Contrast:49
    Saturation:1836
           Hue:284
   Set to defaults
     VCR Mode:VCR
    Blue Only:OFF

Sample
  R:119 G:44   B:72
```

```
Color Balance

  Test pattern:OFF
  Hide menu
  Reset values
  Save to clipboard
  Recall from clipboard
White balance
  Adjust all  (clipboard)
  Red   21       (31)
  Green 11       (21)
  Blue  12       (22)
Gray balance
  Adjust all
  Red   11       (11)
  Green 11       (11)
  Blue  11       (11)
```

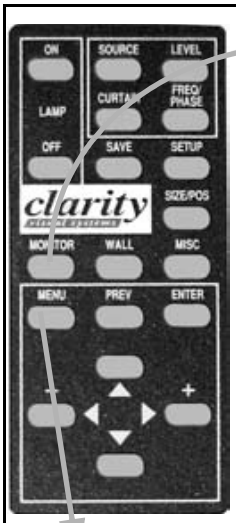
```
 Position
  Image

 Find Position
```

Size/Pos for details, see page 100, 10





Monitor for details, see page 24



When the Cube Status menu is on, the On-Screen Diagnostic Codes will also be displayed. See page 22 for details.

```
Cube Status

Display: Lion UXP 1600x1200
Lamp F:On
Lamp R:On
      Intake Fan: On
     Exhaust Fan: On
      Optics Fan: On
        Lamp Fan: On
   F Ballast Fan: On
   R Ballast Fan: On
Fan Mon: Off
    Lamp Bay Door: Ok
       350V Power: Ok
Interlock Mon: On
LI: none                348:36
```

```
Serial Status

Baud Rate:19.2Kbps
    Group:0 (00)
     Unit:a (10)

          Port 1                Port 2
     In        Out         Load        Trace
Rx:0000000000 0000000000 0000000000 0000000000
Tx:0000000000 0000000000 0000000280 0000617691

  Parity:0000000000           0000000000
Overrun:0000000000           0000000000
  Break:0000000000           0000000000
Framing:0000000000           0000000000
```

```
Main Menu

Source Select
Frequency/Phase
Input Levels
LCD Alignment
Position
Zoom
Wall Processor
Aspect Ratio
Color Balance
Curtain
Hours
Memory
Misc Control
Status Monitor
About
```

```
Setup Summary

RS-232 Address: 00
Source/Mode: DIG/UXGA60
Color Bal: 31,6,6/7,7,7
Wall: 1x1 1:1   Wall OFF
Aspect: Right,Fill
Size/Pos: 1600x1200/465,41
```

```
Board Jumpers

15-16 Open       Intlk Defeat
13-14 Open
11-12 Open       V,X18b,UX
 9-10 Open       SV,X18b,X24b
 7-8  Open       SX,UX,X24b
 5-6  Open
 3-4  Open
 1-2  Open       EPF10K10 Load
```

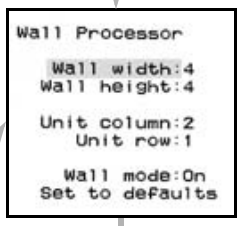
```
Status Menu

Cube Status
Setup Summary
Serial Status
Board Jumpers
Hardware Versions
```

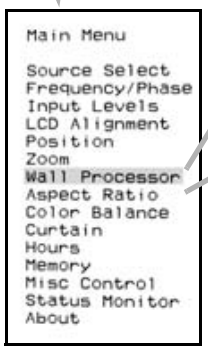
To the individual menus.

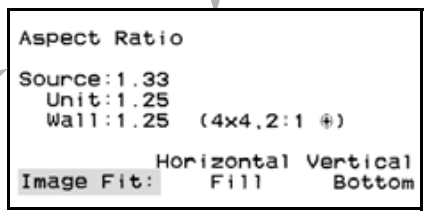
```
Hardware Versions

VPC3230D:00003002
  gmVLX1a:00000022
FMS9884A:00000000
     gmZ4:00000090
     FPGA:00000006
    Flash:0001005b
```

Wall for details, see page 94

Aspect Ratio for details, see page 96, 98







Misc for details, see page 128, 130, 132

Main Menu

Source Select
Frequency/Phase
Input Levels
LCD Alignment
Position
Zoom
Wall Processor
Aspect Ratio
Color Balance
Curtain
Hours
Memory
Misc Control
Status Monitor
About

Misc. Menu

Misc. Options
Lamp Control
Test Patterns
Curtain Color
Baud Rate
RS-232 Address
Mode Detect
IR Disable

To the individual menus.

Misc. Options

Beeper:Off
Horz Flip:Norm
Auto Lamp:On
Sharpness:On
Allow Frame Lock:On
Auto Codes:On
Invert Odd/Even: On

Lamp Control:

Status:
Lamp F: On
Lamp R: On

Lamp count:2
Lamp Fail Msg:On
Lamp Rest:Enabled
Rest Starts at:02:00

Current Time:14:48

Test Patterns

●None
White
Black
50% Gray
Red
Green
Blue
Alignment
Geometry

Curtain Colors

User:Red
Src Absent:Green
Auto Detect:Blue

Baud Rate

9.6Kbps
●19.2Kbps
38.4Kbps
57.6Kbps
115.2Kbps

Address Select

RS-232:
Group:0 (00)
Unit:0 (00)

Mode Detect

Testing Messages :Off
Src Abs Message :On
Auto Detect :On
(On enables following)
Auto Loop Enable:Off
Auto Position :On
Auto Phase :On

IR Disable

Disable IR? Yes No

Menu

The main menu provides other paths to get to many of the functions found in the 'hot keys.'

```
Main Menu

Source Select
Frequency/Phase
Input Levels
Position
Zoom
Wall Processor
Aspect Ratio
Color Balance
Curtain
Hours
Memory
Misc Control
Status Monitor
About
```

```
Source Select

   Source:Analog 1
     Mode:SVGA 60Hz
Find Mode:Finished
     Scan:Progressive
     Sync:H & V

  -- Current --
Source:Analog 1
  Mode:SVGA 60Hz
  --  actual   (typical) --
H Freq:37974 (37680)
 Lines:628    (  628)
V Freq:60     (   60)
```

```
Frequency/Phase

Frequency:1056 (1056+0)
Phase:    0
Find Phase
Find Freq/Phase
 (requires full width input)
Default Frequency
```

```
     Analog Level

Auto Black adjust
    (requires black field)
Auto White adjust
    (requires white field)
  -- Manual Black Adjust --
       Level Sample
All
Red      20      0
Green    20      0
Blue     20      0
  -- Manual White Adjust --
All
Red     175      0
Green   176      0
Blue    178      0
```

```
LCD Panel Alignment

↔ Left edge

↔ Right edge

↔ Horizontal

  Alignment Dashes
  Geometry Pattern
```

```
Position
 Image

      ↑
   ←     →
      ↓

Find Position
```

```
Zoom Control

Width:
    Left edge ← →
   Right edge ← →
       Width:1280

Height:
     Top edge ← →
  Bottom edge ← →
      Length:1024

Misc:
  Centered zooming:OFF
  Set to defaults
```

```
Wall Processor

  Wall width:2
 Wall height:2

 Unit column:1
    Unit row:2

  Wall mode:On
Set to defaults
```

```
Aspect Ratio

Source: 1.25
  Unit: 1.33
  Wall: 1.33  (4x4,2:1 +)

                Horizontal Vertical
Image Fit:         Fill       Fill
```

```
Color Balance

  Test pattern:OFF
  Hide menu
  Reset values
  Save to clipboard
  Recall from clipboard
White balance
  Adjust all  (clipboard)
  Red   21        (31)
  Green 11        (21)
  Blue  12        (22)
Gray balance
  Adjust all
  Red   11        (11)
  Green 11        (11)
  Blue  11        (11)
```

```
Curtain Menu

User Curtain On/Off
Curtain Colors
```

```
Hours

 System Hours: 4964:15
Runtime Hours: 2182:20
 Lamp F Hours: 2047:07
 Lamp R Hours: 2050:00


Reset lamp:F
   Yes No
```

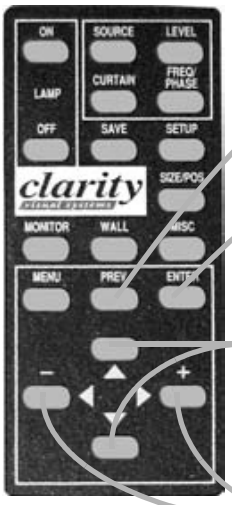
```
 Recall

   AN1 SVGA60 4x4,1:4+
1 ☑ 132 25□ 37□ 49□ 61□
2 ☑ 14□ 26□ 38□ 50□ 62□
3 □ 15□ 27□ 39□ 51□ 63□
4 □ 16□ 28□ 40□ 52☑ 64□
5 □ 17□ 29□ 41☑ 53□ 65□
6 ☑ 18□ 30□ 42□ 54☑ 66□
7 □ 19□ 31□ 43□ 55□ 67□
8 □ 20□ 32□ 44□ 56□ 68□
9 □ 21□ 33□ 45□ 57□ 69□
10□ 22□ 34□ 46□ 58□ 70□
11□ 23□ 35□ 47□ 59□ 71□
12□ 24□ 36□ 48□ 60□ 72□
```

```
 Save

   AN1 SVGA60 4x4,1:4+
1 ☑ 132 25□ 37□ 49□ 61□
2 ☑ 14□ 26□ 38□ 50□ 62□
3 □ 15□ 27□ 38□ 51□ 63□
4 □ 16□ 28□ 40□ 52☑ 64□
5 □ 17□ 29□ 41☑ 53□ 65□
6 ☑ 18□ 30□ 42□ 54☑ 66□
7 □ 19□ 31□ 43□ 55□ 67□
8 □ 20□ 32□ 44□ 56□ 68□
9 □ 21□ 33□ 45□ 57□ 69□
10□ 22□ 34□ 46□ 58□ 70□
11□ 23□ 35□ 47□ 59□ 71□
12□ 24□ 36□ 48□ 60□ 72□
```

```
Misc. Menu

Misc. Options
Lamp Control
Test Patterns
Curtain Color
Baud Rate
RS-232 Address
Mode Detect
IR Disable
```

```
Status Menu

Cube Status
Setup Summary
Serial Status
Board Jumpers
Hardware Versions
```

```
Clarity Visual Systems
9025 SW Hillman Court
Suite 3122
Wilsonville, OR 97070
USA
Tel (503) 570-0700
Web www.ClarityVisual.com

Project: 573-1012-00
Version: Rev A
  Build: 0057
   Date: Thu, Nov 21, 2002
Display: Lion XP 1024x768
    LUT: Lion XP RGB
```



Prev Closes the last menu that was opened.

Enter Enters the current data, or goes to selected menu

Moves cursor (highlight) up and down.
In Position (only), moves image up and down.

Adjusts values. Right (+) moves to next menu.
In Position (only), moves image left and right.

9.2 On-Screen Diagnostic Codes and LEDs

Press the MONITOR *button to see the* On-Screen Diagnostic Code.

Lion UXP On-Screen Diagnostic Codes

	Condition	Priority	Each block represents 0.2 seconds
Starts with Red Lamps turn off.	Lamp Bay door open	1	R ▯ R ▯ R ▯ ▯ ▯ ▯ ▯ ▯ ▯ ▯ ▯ ▯
	Any Fan stopped	2	R ▯ Amber ▯ ▯ ▯ ▯ ▯ ▯ ▯ ▯ ▯
	350 V missing	3	R ▯ R ▯ Amber ▯ ▯ ▯ ▯ ▯ ▯ ▯ ▯
	Sensor overtemp, lamps off [1]	4	R ▯ Amber ▯ R ▯ ▯ ▯ ▯ ▯ ▯ ▯ ▯
	Lockout [2]	5	R ▯ R ▯ R ▯ R ▯ ▯ ▯ ▯ ▯ ▯ ▯ ▯
Starts with Amber. Lamps stay on.	Sensor overtemp, lamps not off [3]	6	Amber ▯ R ▯ R ▯ ▯ ▯ ▯ ▯ ▯ ▯ ▯
	Lamp failure, either lamp	7	Amber ▯ R ▯ Amber ▯ ▯ ▯ ▯ ▯ ▯
	Sensor approached limit	8	Amber ▯ R ▯ ▯ ▯ ▯ ▯ ▯ ▯ ▯ ▯
	Standby state [4]	9	Amber ▯ Amber ▯ ▯ ▯ ▯ ▯ ▯ ▯ ▯ ▯
	Lamps on, no alarms	10	Amber on continuously

R = Red

[1] Sensor over limit and Temp Monitor is On.

[2] Conditions 1, 2, 3, or 4 will cause Lockout. After fixing the problem, you may see Condition 5, Lockout. You must cycle AC power off, then on, to reset the Lockout condition.

[3] Sensor over limit and Temp Monitor is Off.

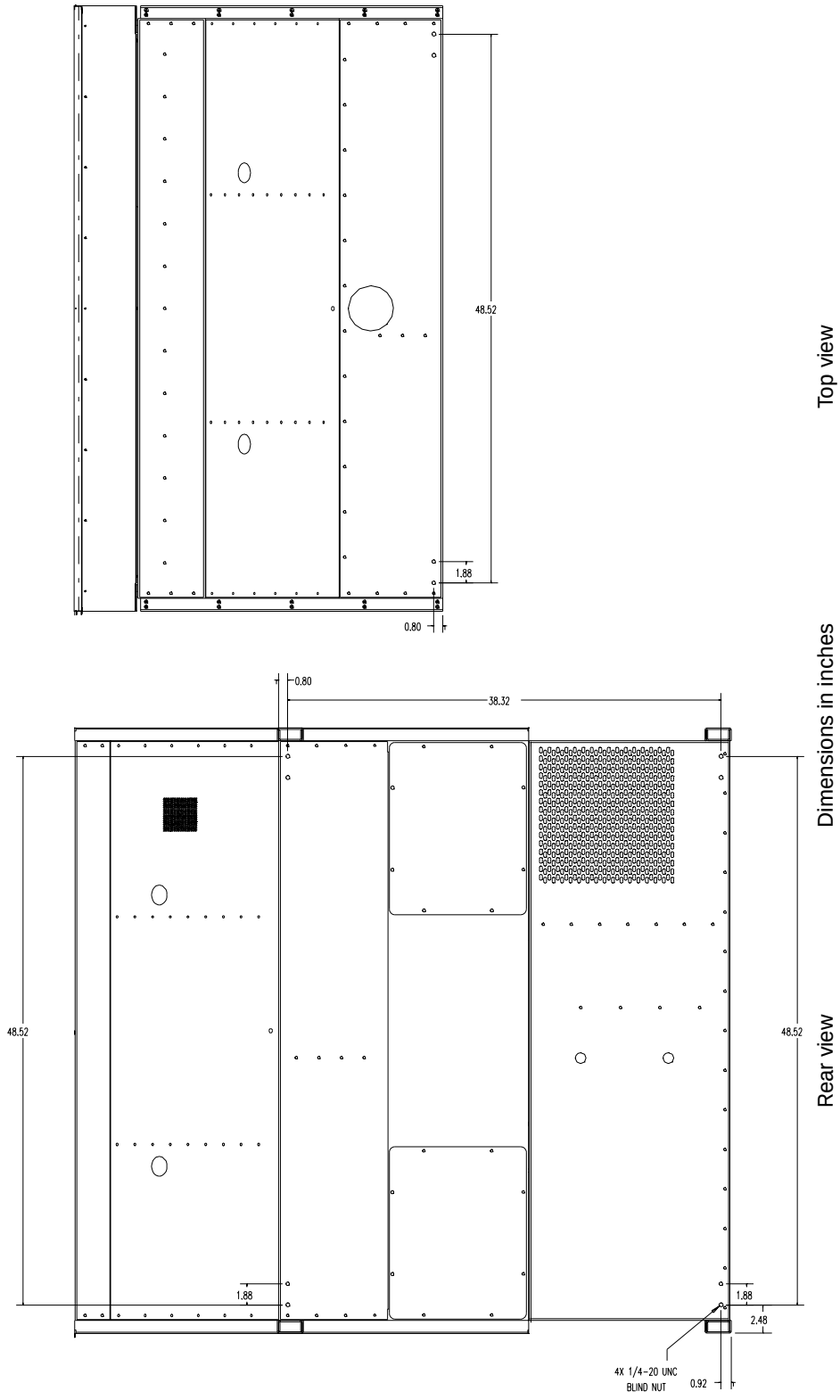
[4] Waiting for a Lamp On command.

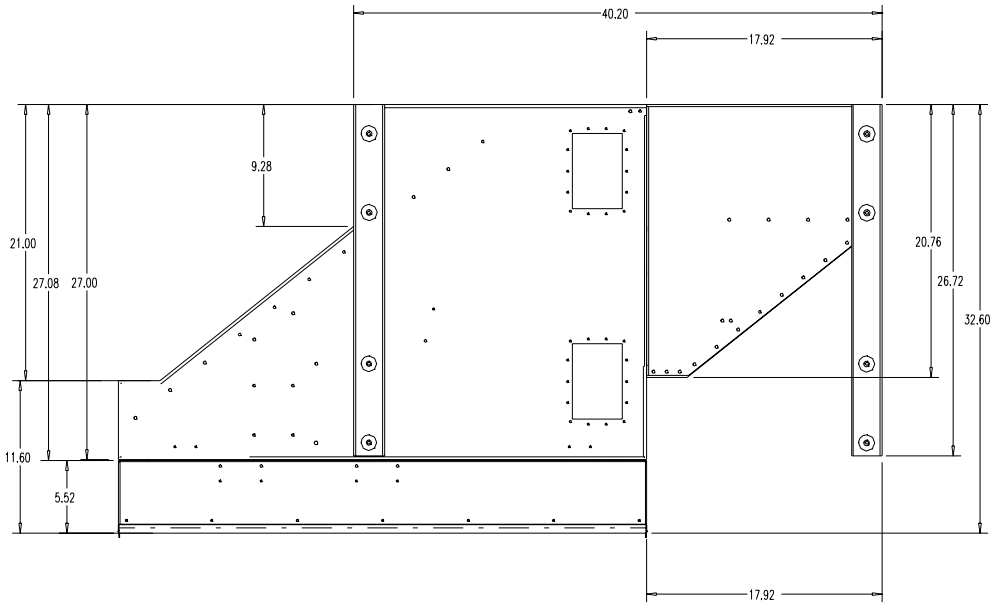
LEDs on the front edge of the electronics module as seen from the rear.

Diagnostic LEDs on the Electronics Module

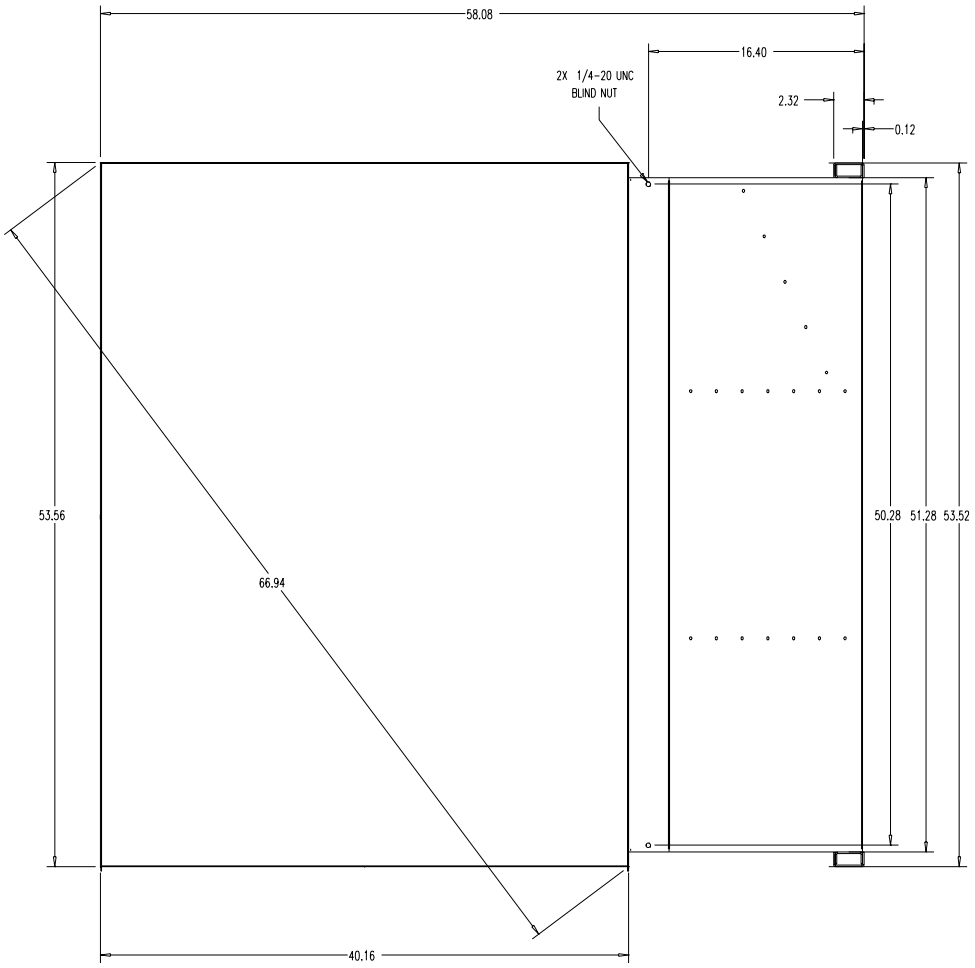
LED	Off	Green	Red	Amber
Lamps, Front and Rear	Off	On	Failed	Striking, but not lit yet. If Lamp Control is off, and the lamp has failed, the LED will remain amber.
Fans, all		Running	Failed; all lamps shut off	Failed, lamps not shut off
Interlock		Normal; interlocks closed	Lamp Bay cover open or thermal cutoff open.	
Temperature		Normal	Temperature exceeded limit	Temperature approach-ing limit
RS232 Data		On green for one second when any RS232 data is received		
RS232 CMD		On green for one second when data for this cube is received		
Remote IR		Flickers whenever IR is detected from any source, including Remote		
Standby	Normal (lamps on)	Ready for Lamp ON command		
Lockout	Normal (Standby or lamps on)	Lamps can’t be lit during this time; wait.	An interlock or other failure event occurred. You must cycle power to reset this Lockout.	
Source		Normal; valid source detected	Source not valid or no source	Testing for sync type

9.3 Measurement Drawings, Lion XP, UXP





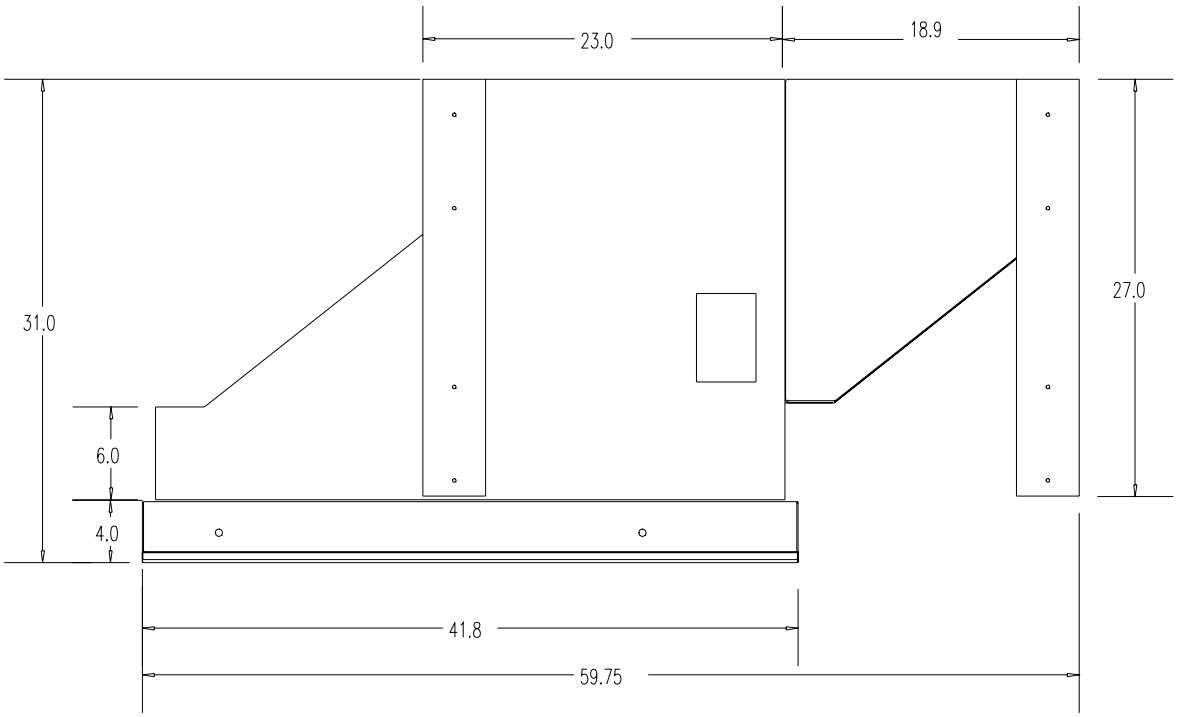
Side view

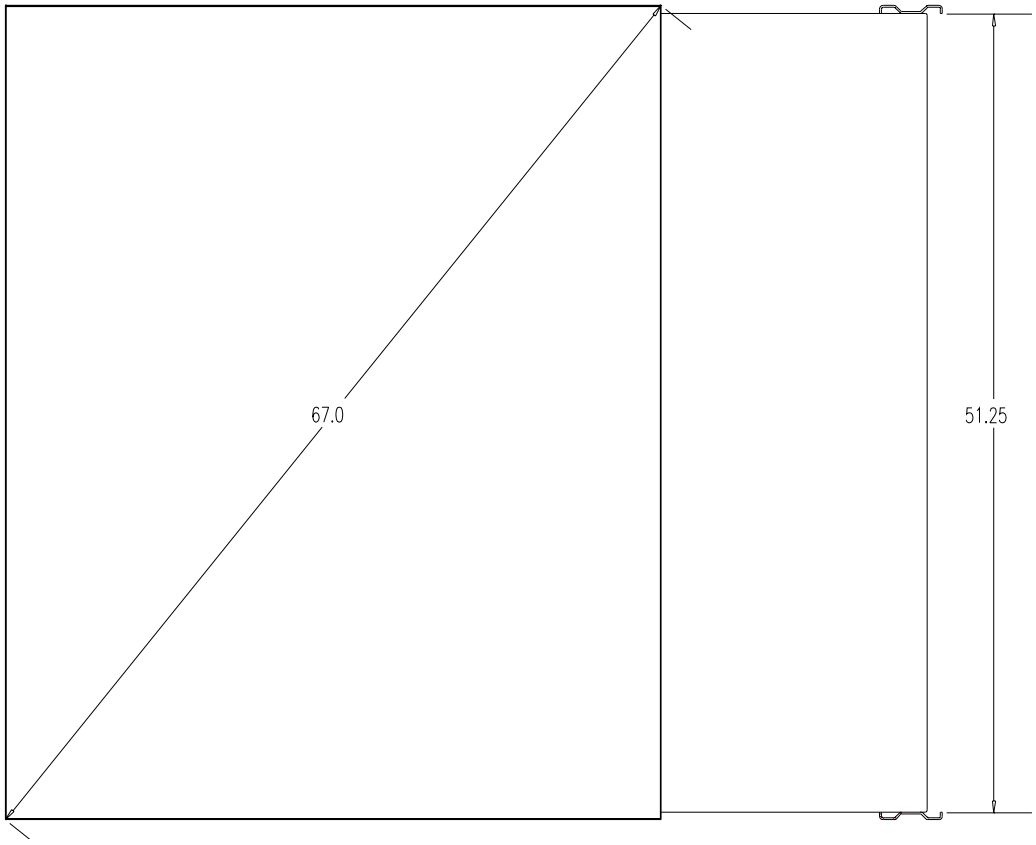


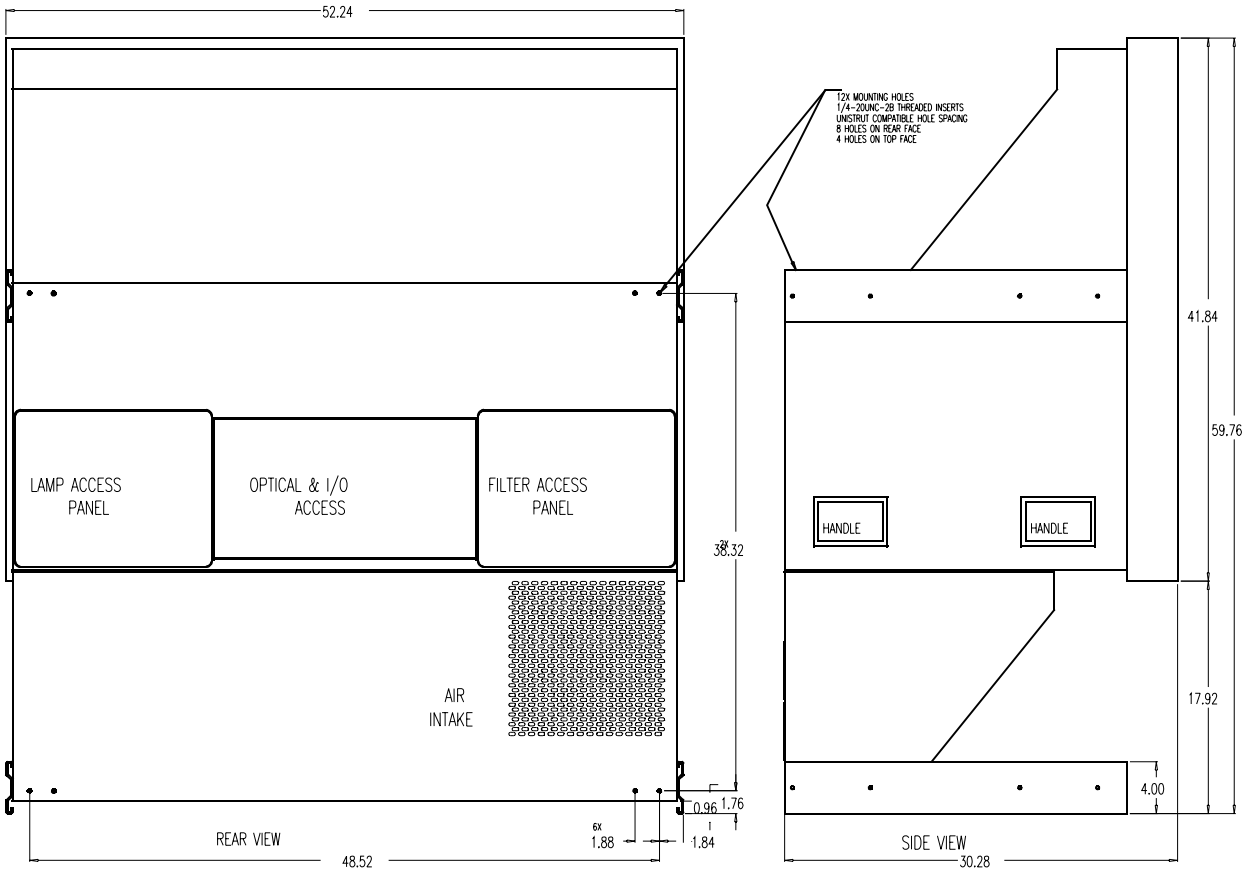
Dimensions in inches

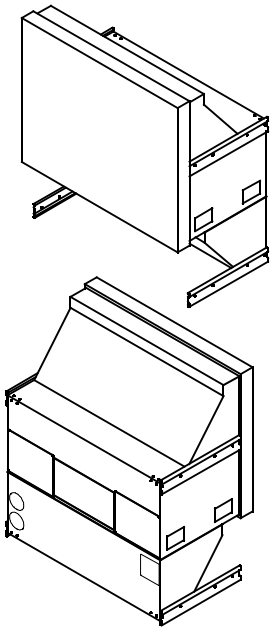
Front view

9.4 Measurement Drawings, Lion SXP



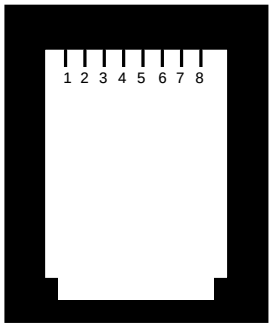



52.24
12X MOUNTING HOLES
1/4-20UNC-2B THREADED INSERTS
UNISTRUT COMPATIBLE HOLE SPACING
8 HOLES ON REAR FACE
4 HOLES ON TOP FACE
LAMP ACCESS PANEL
OPTICAL & I/O ACCESS
FILTER ACCESS PANEL
AIR INTAKE
HANDLE
HANDLE
38.32
41.84
59.76
17.92
4.00
0.96
1.76
6X
1.88
1.84
REAR VIEW
SIDE VIEW
48.52
30.28



9.5 Connector Diagrams

These are connector diagrams with pin designations. All connectors on these pages are shown looking at them from the outside, not from the solder side.These diagrams look at the outside of the connector, as the cable sees it, not the wiring side.



RS232 In (Out is same)
RJ45 connector viewed from the outside, looking into it as the cable does.

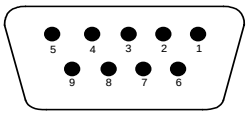
1. No connection
2. No connection
3. Transmit Data (TXD)
4. Ground (earth)
5. Ground (earth)
6. Receive Data (RXD)
7. No Connection
8. No connection

Wiring the adapter

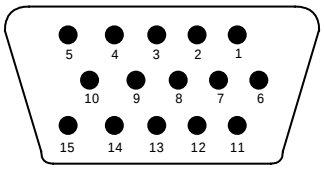
To change the RJ45 connectors to 9-pin D-sub connectors, use a standard RJ45-to-9-pin adapter and connect it internally as shown. The wiring shown for this adapter is correct for *straight-thru* cables.

Yellow wire	pin 3
Black wire	pin 2
Green wire	pin 5

RJ45	9-pin
6	3
5	5
3	2

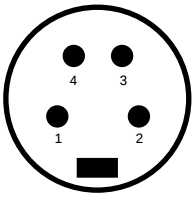


✎ You can tell if a cable is wired straight-thru by looking at its two ends side-by-side. Hold the cable ends next to each other, both ends pointing away from you. Have the clips on both connectors pointing down so you can't see them. If the color coding on the two connectors is the same, left to right, the cable is straight-thru. The order of the colors doesn't matter, as long as they are both the same.



Analog In and Out, 1 and 2 (female connector)

1. Red Video
2. Green Video
3. Blue Video
4. No connection
5. No connection
6. Ground
7. Ground
8. Ground
9. No connection
10. Ground
11. No connection
12. No connection
13. Horizontal sync/Composite sync
14. Vertical sync
15. No Connection



S-Video In and Out (female connector)

1. Ground
2. Ground
3. Y (Luma)
4. C (Chroma)

9.6 Glossary of Terms

A list of terms used in this manual.

Term	Meaning
2-lamp	A Lion or Panther that has accommodation for 2 lamps, regardless of how many are installed or used.
4-lamp	A Lion or Panther that has accommodation for 4 lamps, regardless of how many are installed or used.
aspect ratio	The ratio of the width to the height of a picture, often expressed as 4-by-3, 4:3, 4×3, or 1.33:1 (the aspect ratio of standard television pictures). 16-by-9 (1.77:1) is the aspect ratio for high-definition TV.
ballast	The electronics part (module) that powers the lamp, providing high voltage to start the lamp and a lower voltage for operation.
big picture	Clarity's Big Picture™, a system for spreading a single source picture over a wall or part of a wall of cubes.
big picture key	The small board that enables the electronics module to make Clarity's Big Picture™ work.
Bobcat	The name for any Clarity model beginning SN-4025 or SN-4035. A 40" direct view LCD display of 1280 × 768 pixels.
composite sync	Sync signals that combine the horizontal and vertical syncs onto one signal line, separate from the video. RGBS uses this type.

Clarity Display	Aspect Ratio
Lion X, UX, XP, UXP Panther UX, UXP Puma X, XP, UXP Tigress S, X Wildcat S, SE	1.33
Lion SX, SXP	1.25
Bobcat	1.66

Term	Meaning
composite video	A video distribution system in which all the video information, is sent on one wire. Sometimes called C-Video.
cube	One display without regard to others that may be in a wall with it. *See also* unit; display.
C-Video	Composite video; a video distribution system in which all the video information, is sent on one wire.
DA	Distribution amplifier; a device that takes in one input and gives out many of the same type. DAs are available for video, computer and digital signals.
display	One display unit without regard to others that may be in a wall with it. *See also* cube; unit.
DVI	Digital Video Interface, a standard for distributing computer pictures in digital form.
electronics module	The electronic part that controls almost everything about the display. It converts incoming pictures to a form the LCD can use to display pictures and provides control through the remote control and RS232 connections to other functions, such as turning lamps on and monitoring fans.
Fast key	One of the buttons on the remote control that takes you directly to a menu or chain of menus.
Fresnel lens	A flat, groove material, often plastic, that performs functions similar to a normal lens. Used extensively in Clarity LCD products. All screens have a Fresnel lens. Named for the French inventor in 19th century and pronounced "fruh-NELL."
H & V sync	Horizontal and vertical sync on two separate lines. The VGA family uses this type.
key	a push button on the remote control

Term	Meaning
keystone	An image that is wider at the top or bottom, or taller on the left or right.
lamp life	A lamp life of 5,000 hours means that for a *large* group of lamps, after 5,000 hours of use, *at least* half of them will still be operation.
LCD	Liquid Crystal Display: the imaging device used in the Lion, Wildcat, and Panther displays. It works something like a digital watch, but in three colors and with greater detail.
LED	Light Emitting Diode: a small, low power lamp used as an indicator, often red or green, but can be other colors.
Lion	The name for any Clarity model beginning WN-6720.
Lion SX	Model WN-6720-SX with 1280 × 1024 resolution for display, but accepts up to 1600 × 1200 resolution; 4 lamps
Lion UX	Model WN-6720-UX with 1600 × 1200 resolution; 4 lamps
Lion UXP	Model WN-6720-UXP with 1600 × 1200 and two 200W lamps instead of four 100W lamps.
Lion X	Model WN-6720-X with 1024 × 768 resolution for display, but accepts up to 1600 × 1200 resolution; 4 lamps.
Lion XP	Model WN-6720-XP with 1024 × 768 and two 200W lamps instead of four 100W lamps.
module	A stand-alone electronic assembly. Clarity displays are designed to be serviced at the module level, not the component level. That is, the technician changes the whole electronics module rather than changing a small part in it.
mullion	The metal edge surrounding the screen material that holds the screen in place.
native resolution	The resolution of the LCD or DMD itself. This is the highest resolution the display can show, but in some products the display will accept higher resolutions an

Term	Meaning
non-UXP	Refers to all Lions and Panthers that do **not have UXP** in their names and model numbers. These have illumination systems with four lamps. Lion X — WN-6720-X Lion SX — WN-6720-SX Lion UX — WN-6720-UX Panther UX — PN-6740-UX, PN-6730-UX *See also* UXP.
NTSC	The television system used in North America, Japan and parts of South America. It stands for National Television Systems Committee, the group that originally approved it. See also PAL and SECAM.
PAL	The television system used in most of the world. It stands for Phase Alternation Line. See also NTSC and SECAM.
Panther	The name for any Clarity model beginning WN-67**4**0 or WN-67**3**0.
power supply	The device that converts the mains AC voltage to other voltages that the rest of the display can use.
Puma	The name for any Clarity model beginning with WN-5020 or WN-5010.
Puma UXP	Puma with 2 lamps, 1600 × 1200 LCD. WN-5020-UXP
:Puma X	Same as Puma XP, but with only one lamp. Upgrade kit can add the second lamp, making it a Puma XP.
Puma XP	Puma with 2 lamps, 1024 × 768 LCD. Accepts up to 1600 × 1200 and down converts to LCD's resolution.
remote	The remote control.
RGB	Red, green, blue; three parts of a video signal sent on separate wires.
RGBHV	RGB plus sync, where H and V sync are on separate wires.
RGBS	RGB plus sync, where composite sync is on a separate wire.

Term	Meaning
SECAM	The television system used primarily in France, Russia and the former Soviet Bloc countries. Sequential Color and Memory. See also NTSC and PAL.
slot	A memory location; the numbered location in memory
SOG	Sync on green, usually for RGB sources
source	A source of pictures, such as a computer, a VCR, a DVD player or the loop-thru from another Clarity cube.
stack	A group of displays physically bolted together forming a wall.
strike	lighting a lamp or trying to light a lamp
SVGA	Super VGA, a standard for distributing analog computer pictures with a resolution of 800 pixels by 600 pixels.
S-Video	A video distribution system in which the luminance (brightness) and chrominance (color) are sent on separate wires. Short for Super Video.
SXGA	Super extended VGA, a standard for distributing analog computer pictures with a resolution of 1280 pixels by 1024 pixels.
sync on green	The sync part of the signal is combined with the green channel in RGB video. Also called SOG.
Tigress	The name for any Clarity model beginning with WN-5230. The original Tigress, no longer produced, has been replaced by the Tigress S and Tigress X, whose model numbers start with WN-5230**A**.
unit	One complete display. *See also* cube; display.
UXGA	Ultra-extended VGA, a standard for distributing analog computer pictures with a resolution of 1600 pixels by 1200 pixels.

Term	Meaning
UXP	Refers to all Lions, Panthers, Pumas that do **have UXP** in their names and model numbers. These have illumination systems with two lamps. Lion UXP: WN-6720-UXP Panther UXP: PN-6740-UXP, PN-6730-UXP Puma UXP: WN-5020-UXP *See also* non-UXP.
VGA	Video Graphics Adapter, a standard for distributing analog computer pictures with a resolution of 640 pixels by 480 pixels.
video	In this manual, video means NTSC, PAL or SECAM pictures.
video input module	See VIM
VIM	Video Input Module: a optional board which plugs into the electronics module that allows S-Video and composite video inputs.
wall	A group of displays physically bolted together. (Not possible with Panthers.)
Wildcat	The name for any Clarity model beginning WN-4030.
WXGA	Wide XGA, a standard for distributing analog computer pictures with a resolution of 1280 pixels by 768 pixels.
XGA	eXtended VGA, a standard for distributing analog computer pictures with a resolution of 1024 pixels by 768 pixels.

9.7 Regulatory Information

Declaration of Conformity

Manufacturer's Name: **Clarity Visual Systems**
Manufacturer's Address: **9025 SW Hillman Court, Suite 3122**
Wilsonville, Oregon 97070-7708

declares that the products
Model Numbers: **WN-6720-XP, WN-6720-UXP (LCD projector)**
Product Options: **All**

conforms to the following EU Directives and the standards stated:

Safety: **UL 1950 - Safety of IT Equipment**
EN 60950 - Safety of IT Equipment

Electromagnetic Compatibility Directive 89/336/EEC and amendments

EN 55022/CISPR 22 – Radiate and Conducted Emissions from IT Equipment
EN 50082-1/EN61000-4 – Generic Immunity Standard
Inculding: EN61000-4-2Electrostatic Discharge
EN61000-4-3Radiated Susceptibility
ENV50204Radiated Susceptibility
EN61000-4-4Electrical Fast Transient Burst
EN61000-4-5Surge
EN61000-4-6Conducted Susceptibility
EN610004-11Voltage Dips & Interrupts

FCC Regulations
This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in an installation. This equipment generates, uses and can radiate radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate receiving antenna.
- Increase separation between equipment and receiver.
- Connect equipment to an outlet on a circuit different from that to which the receiver is connected.
- Consult your dealer or an experienced radio/TV technician.

Note: Any changes or modifications to the display not expressly approved by Clarity Visual could void the user's authority to operate this equipment. Use of a shielded interface cable is required to comply with the Class A limits of Part 15 of FCC rules.

Other Certifications
UL, CUL, FCC/CISPR 22/85, CE

9.8 Packing for Shipment

The lower section goes on top of the upper section and bolts to it. The screen is not installed on the chassis when it ships.

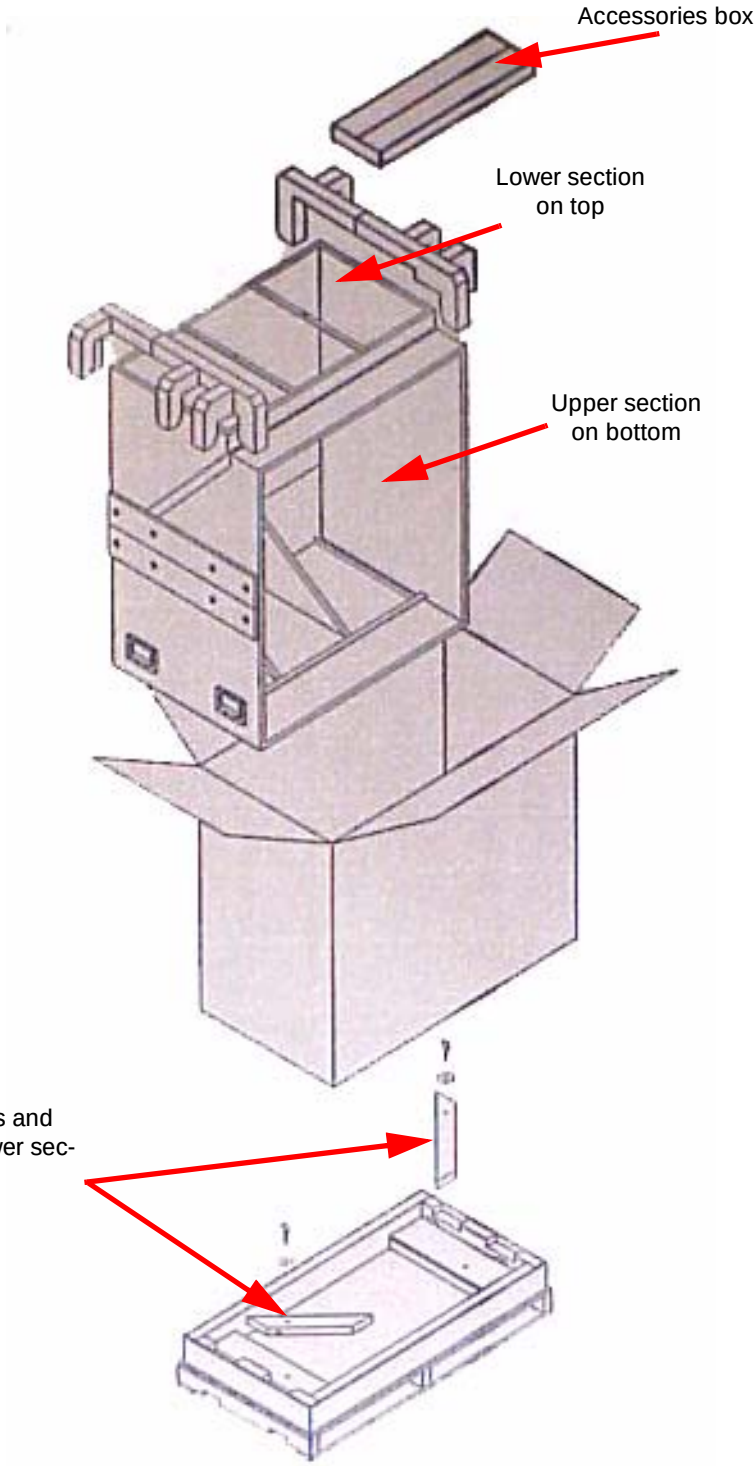
Custom shipping containers

If you build custom shipping cases for Lions that will ship frequently, keep these points in mind:

- The lower, smaller section of the display will ship on top of the upper, larger section and bolt to it. This makes the shipping case smaller.
- The large section should be bolted to the floor of the shipping container to prevent shifting.
- The screen should not be installed on the display when it ships. Ship it separately in the same case, or ship several screens in a different case.

Shipping on pallets

The diagram on the facing page shows the packaging system used to ship the Lion originally.



Screen is in a separate carton on the same pallet.

These wood braces and bolts clamp the lower section to the pallet..

9.9 Specifications

Specifications apply to Lion XP, SXP and UXP as noted.

Mechanical

Specification	Maximum	Minimum	Typical	Notes
Outside dimensions, Lion **SXP**				
Width	52.29”			1328 mm
Height	59.69”			1516 mm
Depth	31.0”			787 mm
Outside dimensions Lion **XP, UXP**				
Width	53.58”			1361 mm
Height	58.11”			1476 mm
Depth	32.6”			828 mm
Weight, all Lions	247 lbs			113 kg
screen	48 lbs			22 kg
lower section	98 lbs			45 kg
upper section	101 lbs			46 kg
Shipping weight	~350 lbs			~159 kg (147L x 109W x 135H cm) (58”L x 43”W x 53”H)
Stacking				
Horizontal	Unlimited			
Vertical	4			
Orientation	20°			Tilt of top surface plane on any axis
Chassis color			Black	
Ventilation requirement		8", 200 mm		Clearance at rear for level displays. For tilted displays, must have enough room to stand and work.
Screen size, Lion **SXP**				Aspect ratio 5:4
Diagonal	67”			1700 mm
Width	52.29”			1361 mm
Height	41.83”			1021 mm
Screen size Lion **XP**, **UXP**				Aspect ratio 4:3
Diagonal	67”			1700 mm
Width	53.6”			1361 mm
Height	40.2”			1021 mm
Mullion	0.07”			1.75 mm
screen-to-screen gap	0.02”			0.5 mm

Electrical and Heat

Specification	Maximum	Minimum	Typical	Notes
Video input amplitude				
Separate RGB analog	1.0 V p-p	0.5 V p-p	0.7 V p-p	75 ohm termination
Composite analog	5.0 V p-p		0.3 V p-p	75 ohm termination

Electrical and Heat

Specification		Maximum	Minimum	Typical	Notes
TTL H and V sync		5.0 V	2.5 V	3.5 V	TTL at 330 ohm termination
Input connectors					
15-pin D-sub female					Analog 1, Analog 2, In and Out
DVI					Digital In and Out; DVI std
BNC (optional)					Composite video
4-pin DIN (optional)					S-Video In and Out
RJ45					RS232 In and Out
Frequency, see table below					
Total pixels, lines, see table below					
AC requirements					
Line voltage	115 V range	120 V	100 V		45–65 Hz auto-ranging, power factor corrected
	230 V range	240 V	200 V		
Line current					
	115 V, 2 lamps	6 A		5.5 A	
	115V, 1 lamp	4 A		3.0 A	
	230 V, 2 lamps	3.2 A		2.7 A	
	230 V, 1 lamp	2.2 A		1.5 A	
Power					
	2 lamps	690 W		633 W	
	1 lamp	460 W		345 W	
Heat, BTUs per hour					
	2 lamps	2373		2167	
	1 lamp	1571		1178	

Optical

Specification	Maximum	Minimum	Typical	Notes
Image position	+1 pixel	–1 pixel	0 pixel	
Rotation	– ½ pixel	+½ pixel	0 pixel	
Pincushion/Barrel	–1 pixel	+1 pixel	0 pixel	
Keystoning	–1 pixel	+1 pixel	0 pixel	
Focus/Aberration				No objectionable defocusing or chromatic aberration at distance of 1.5 screen diagonals by a 20/20 vision viewer
Screen, High-Contrast				
Gain			1.7 ± 10%	Two-part screen composed of a front glass BlackScreen and a back Fresnel lens
Viewing cone, 2 gain, H & V	70° (±35°)			
Viewing cone, 5 gain, H & V	90° (±45°)			
Brightness, 2 lamps			50/55 ftL	UXP/XP
Brightness, 1 lamp			25/27.5 ftL	UXP/XP
Quality View Metric (QVM)[1]			6800	with two lamps on

Optical

Specification	Maximum	Minimum	Typical	Notes
QVM at 50° viewing angle			300	with two lamps on
Screen, Wide-View				
Gain			1.0±10%	
Viewing angle, 2 gain, H & V	80°			80° = ±40°
Viewing angle, 5 gain, H & V	135°			135° = ±67.5°
Brightness, 2 lamps			30/32 ftL	UXP/XP
Brightness, 1 lamp			15/16 ftL	UXP/XP
Quality View Metric (QVM)[1]			2500	with two lamps on
QVM at 50° viewing angle			600	with two lamps on
Brightness uniformity, either screen			> 80%	ANSI 13-point standard
Contrast ratio			>1,500	Dark room
Resolution, see table below				
Lamp life, hours 200W high pressure mercury			8000	Median (50% of lamps still operational after the specified median lamp life)

1. Clarity's Quality Viewing Metric (QVM) is a comprehensive measure of image quality. It combines the effects of brightness, contrast and ambient light to yield a more meaningful measurement for evaluating perceived image quality. See www.ClarityVisual.com for more information on QVM and image quality.

Environmental

Specification		Maximum	Minimum	Typical	Notes
Temperature	operating	40° C, 95° F	0° C, 32° F		All performance specifications are maintained within this temperature range
	non-operating	60° C, 140° F	–10° C, 14° F		
Altitude (barometric pressure)		10,000 ft			Above sea level, or equivalent barometric pressure
Humidity		80% R.H.	20% R.H.		40° C non-condensing

Formats Supported at Analog 1, Analog 2 and Digital Connectors

Resolution	Name	Refresh rate (Hz)	H Freq (kHz)	Pixel Freq (MHz)	Pixels per line
640 × 480	VGA	60	31.5	25.175	800
		72	37.9	31.5	832
		75	37.5	31.5	840
		85	43.3	36	832

Formats Supported at Analog 1, Analog 2 and Digital Connectors

Resolution	Name	Refresh rate (Hz)	H Freq (kHz)	Pixel Freq (MHz)	Pixels per line
800 × 600	SVGA	56	35.1	36	1024
		60	37.9	40	1056
		72	48.1	50	1040
		75	46.9	49.5	1040
		85	53.7	56.25	1048

Formats Supported at Analog 1, Analog 2 and Digital Connectors

Resolution	Name	Refresh rate (Hz)	H Freq (kHz)	Pixel Freq (MHz)	Pixels per line
1024 × 768	XGA	60	48.4	65	1344
		70	56.5	75	1328
		75	60.2	78.75	1312
		80	64	85.5	1376
		85	68.77	94.5	1376

Formats Supported at Analog 1, Analog 2 and Digital Connectors

Resolution	Name	Refresh rate (Hz)	H Freq (kHz)	Pixel Freq (MHz)	Pixels per line
1280 × 1024	SXGA	60	64	108	1688
		60 (a)	63.5	109.9	1730
		70	77.4	130.6	1726
		75	80	135	1688
		85	91.1	157.5	1728
1600 × 1200	UXGA	60	75	162	2160
640 × 480	MAC	67	34.97	31.33	859
832 × 624		75	49.72	57.28	1152
720 x 480p	HDTV	60	31.54	27.00	858
1280 × 720p		60	45	74.25	1650
1920 × 1080i		30	33.75	74.25	2200
720 × 400	VESA	70	31.47	28.32	936
720 × 400		85	37.9	35.5	936
1024 × 1024i	1024 × 1024i	60	63.3	89.12	1323
1024 × 1024ni	1024 × 1024ni	60	64.5	88.75	1376

Formats Supported at Analog 1, Analog 2 and Digital Connectors

Resolution	Name	Refresh rate (Hz)	H Freq (kHz)	Pixel Freq (MHz)	Pixels per line
1152 × 900	SUN	66	61.8	92.99	1504
1152 × 900		76	71.73	105.59	1472

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Clarity Visual Systems • 9025 SW Hillman Court • Suite 3122
Wilsonville, OR, 97070-7708, USA
Main Phone: +1 503 570 0700 • Customer Service Phone: +1 503 570 4634 • Fax: +1 503 570 4657
www.ClarityVisual.com • Service@ClarityVisual.com

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